ELECTRONIC DATA INTERCHANGE

IMPLEMENTATION

CASE STUDIES

INPUT

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Planning Services for Management

MAY 1988

EDI IMPLEMENTATION CASE STUDIES

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Published by
INPUT
1280 Villa Street
Mountain View, CA 94041-1194
U.S.A.

**Electronic Data Interchange Planning
Service (EDI)**

EDI Implementation Case Studies

EUSR • 295 • 1988

Abstract

This report outlines the experience of four leading firms in implementing EDI programs: Levi Strauss & Co., Mervyn's, Hewlett-Packard, and "International Logistics Management Company", a major transportation company serving domestic and international markets.

Though the industries represented are quite different—electronics manufacturing, apparel manufacturing, retail distribution, and transportation—there are striking similarities in the approach taken by each of these firms and their experience with EDI.

These four case studies emphasize the management issues involved in EDI implementation. These firms have been leaders in solving the technical/standards issues associated with EDI, and that leadership has been a significant part of their management strategy. But their primary focus has been on changing the way their industries operate. By capturing this kind of a leadership role, these companies have created a strategic advantage for themselves that far outweighs any operational cost savings they may realize from EDI.

The lessons learned from these case studies have broad applicability and can serve as a valuable management guide for launching EDI in nearly any type of firm. Further, the study can help EDI network/processing, software, and professional service firms understand the inside dynamics of companies considering their EDI options, allowing vendors to focus their efforts for maximum customer and company benefit.

This report contains 83 pages, including 28 exhibits.

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I

Introduction

Introduction

A
Background

The opportunities and advantages of Electronic Data Interchange (EDI) are capturing the minds of many IS executives. The topic is receiving a great deal of coverage in the trade press, and there is a rapidly growing interest in the issues of standards, network and mailbox alternatives, translation software, etc.

However, the most significant impact of EDI is not on the IS organization, but on the overall operations of the firm. EDI is a tool, and the IS group is a catalyst for major changes in the way the business is conducted —both internally and externally. Therefore, the primary focus of anyone starting on the road to EDI should be on management issues rather than technical issues.

B
Purpose and Scope

This study is not a primer or checklist of technical issues, nor does it contain a list of EDI service and software providers. There are several sources for such information, including the EDI Planning Service (ED-IPS) offered by INPUT.

Instead, this study reports on the implementation strategies of four leaders in the EDI revolution and provides managers with a framework for addressing the key issues surrounding the implementation of an EDI system.

Among the issues addressed are the following:

- How to change production and inventory systems through EDI

- How EDI can change relationships with customers and suppliers with respect to:

  - service levels/responsiveness
  - shifting tasks from one party to another

- building strategic relationships with trading partners
- capturing an industry leadership role

• How EDI implementation costs should be justified and evaluated

• How the implementation process should be managed in:

- planning/steering/approval
- communicating and "selling" the concept
- encouraging/supporting trading partners

C

Methodology

Four firms in different industries were selected by INPUT for their leadership in EDI and asked to participate in this study. One of these firms did not wish to be publicly identified, so its background has been disguised and its name changed to "International Logistics Management Company", or LoMan Co. These firms are shown in Exhibit I-1.

EXHIBIT I-1

EDI CASE STUDIES

Firm	Industry
"International Logistics Management Company" (Lo Man Co)	International Logistics Management
Hewlett-Packard	Electronics Manufacturing
Levi Strauss & Co.	Apparel Manufacturing
Mervyn's	Retail Distribution

Information about these companies was collected from public sources such as annual reports, newspapers and magazines, the trade press, etc.

A Case Study Outline was then developed, along with a list of specific questions and topics for discussion. (A copy of the outline is included as Appendix A.) This outline was sent to each of the companies for review. Personal interviews were then scheduled with key managers responsible for EDI implementation in each firm.

This study reports on the information gained from these interviews.

D
Organization of the Report

The Executive Summary provides an overview of the observations made and the conclusions and recommendations reached through these interviews.

The next four chapters provide the results of the individual firm interviews. Each chapter starts with a background of the firm and its industry and continues with a detailed description of the experiences the company had with the launching of its EDI program.

The final section summarizes each of the four case studies and provides general observations from the managers who were interviewed.

The results and conclusions of this report are solely the responsibility of INPUT and may not necessarily match those of the subject companies.

E
Related INPUT Reports

This report is one in a series published by INPUT's Electronic Data Interchange Planning Service (EDIPS). Others in the program include:

- *U.S. EDI Service Markets*

- *EDI Service Provider Profiles*

- *EDI Software Markets*

- *EDI Software Provider Profiles*

- *U.S. Federal EDI Markets*

- *International EDI Services*

- *Vertical Market EDI Potentials and Directions*

- *X.400 Electronic Messaging Standard Products and Services*

- *EDI and Professional Services*

- *EDI and Value Added Data Services in Western Europe*

Additionally, EDIPS produces the *EDI Reporter* monthly newsletter, presents an annual conference, and does customized research projects and EDI educational seminars. For more information about these services and publications, contact any INPUT office.

II

Executive Overview

II
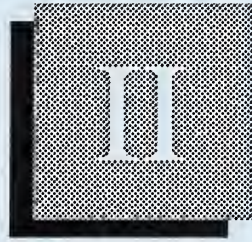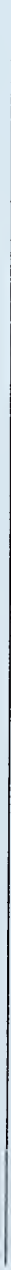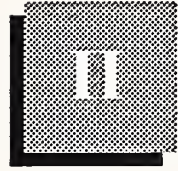
Executive Overview

This Executive Overview is designed to help the reader quickly review the conclusions and recommendations that are detailed in this report. Each key point is summarized in an exhibit, with accompanying explanations.

The report is primarily concerned with the managerial issues involved in EDI system implementation such as:

- The benefits associated with EDI
- How EDI implementation costs should be justified and evaluated
- How should the implementation process should be managed

This report is based on in-depth interviews with firms leading the EDI revolution. The main body of the report is the set of case studies resulting from these interviews. The concluding chapter summarizes the four cases and includes various observations and recommendations made by each of the managers interviewed.

A

The EDI Umbrella

Traditionally, EDI is thought of as an electronic replacement of paper, providing direct computer-to-computer transmission of formatted data such as purchase orders, invoices, etc.

However, as shown in Exhibit II-1, there are other electronic forms of communication between trading partners, and many firms manage all of them under the umbrella called EDI.

As used in this study, EDI can be any form of electronic interchange of data between a firm and its trading partners. Our definition of trading partners is broad. It encompasses:

- Direct (product or component) suppliers

- Customers

- Service suppliers such as insurance firms, transportation companies, banks, communications carriers, etc.

- Other units of the same firm

EXHIBIT II-1

THE EDI UMBRELLA

EDI

Traditional EDI

- Computer-to-Computer

- Scheduled, Batch

- Examples:
  - Purchase Orders
  - Invoices

Other Electronic Communications

- Device-to-Computer

- Ad-Hoc, Interactive

- Examples:
  - Status Inquiry
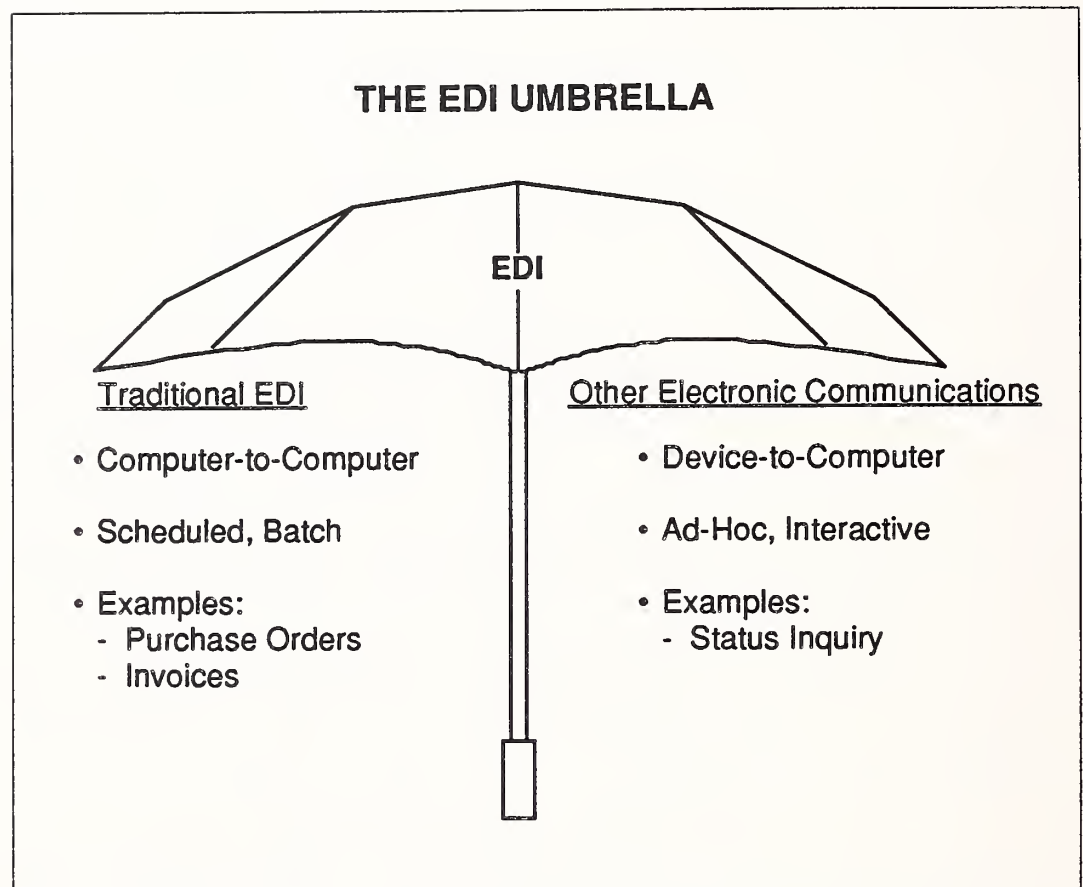
This definition is based on how the case study firms manage what *they* consider to be EDI.

- For example, direct access into a firm's data bases via touch-tone telephone or computer terminal is replacing many telephone calls and customer visits to inquire about the status of checks, orders, shipments, etc.

- Also, a person with a computer terminal can get stock quotations and send orders directly to his brokerage firm, eliminating the need to call his broker.

Though the primary focus of EDI remains on direct data interchange between computers, it is important to consider the implications of this

extended definition when making long-range plans for a firm's EDI architecture.

B
Advantages of EDI

The advantages of using EDI can be divided into two categories—direct benefits and indirect benefits, as shown in Exhibit II-2. The indirect benefits can be further divided into tactical and strategic categories. Of these two, the most commonly discussed are the direct benefits; however, the indirect advantages are usually the most important.

EXHIBIT II-2

ADVANTAGES OF EDI

Direct

Cost Savings
from Changing Process
from Paper to Electronic

Indirect

Competitive Advantage
from Changing Business
Processes

Tactical

• Close Management of
Individual Items and
Transactions
- Inventories
- Orders/Shipments
- Payments

Strategic

• Building Closer, Long-Term
Trading Partner Relationships

• Controlling The Nature and Pace
of Change in Industry Practices

1. Direct Advantages

Several direct advantages come from replacing paper communications with electronic communications. These advantages are commonly used to justify automating a manual process:

• Reduced staff levels through less paper handling

- Reduced overhead and administrative costs (including paper and supply inventories, filing, etc.)

- More accurate data transmission/translation requiring fewer follow-ups and error corrections

- Improved data timeliness

Such benefits are traditionally quantified and traded off against systems development costs. Firms that have done postimplementation audits of these factors have generally found that EDI does indeed produce net benefits over and above implementation costs.

- However the EDI phenomenon is still so new that it is hard to determine the long-run return on investment (ROI) from an EDI implementation.

- It may be that the management time and attention, and the funds involved in implementing EDI, could be used more productively in another venture—*if* direct benefits were the primary justification for the system.

2. Indirect Advantages

Indirect advantages come about when EDI is used as a tool to enable other changes in the way a business is run. Those changes that are related to daily operations are classified as tactical; the remainder are classified as strategic.

a. Tactical Advantages

EDI allows the management of individual items at a level of detail never before possible. Individual items can include almost anything that moves:

- Shipping containers
- Physical products such as computers, pants, etc.
- Purchase orders, invoices, payments, etc.

Separate handling and detailed tracking of individual items reduces the probability of any item going astray or "getting lost in the system." It also reduces the costs of investigating and correcting problems. In addition, this capability enables tighter inventory management —a tactical advantage that can apply to both trading partners and appear in many ways.

- Both producer and consumer can reduce their overall stocking levels. EDI reduces the uncertainties that create the need for "safety stocks."

Reduced stocking levels and fewer out-of-stock situations translate to higher inventory turns and a higher ROI.

- Coupling EDI with point of sale (POS) tracking of individual items allows slow-moving items to be identified and reduced or eliminated from inventory instead of being bundled in a general reorder.

- EDI/POS coupling allows new approaches to purchasing and distribution. An example is Mervyn's "post-distribution" concept, where a buyer places a single order for an entire chain but store allocations are not determined until just prior to shipment, based on replenishment demands of the individual stores.

- Production management is simplified with more accurate and timely demand estimates. There is less work-in-process inventory, fewer cases of over/under production, and better responsiveness to changes in demand for specific items.

Though these examples are couched in terms of producers and distributors such as Hewlett-Packard, Levi Strauss & Co., and Mervyn's, the underlying principles also apply to service providers such as Lo Man Co.

- Lo Man Co. manages an inventory of cargo containers and transport space on ships, trains, planes, etc. The company needs to know the status of each individual container at all times and has to make "real-time" decisions about reallocating this inventory—essentially a production management decision.

- There is also constant customer demand for status information, and Lo Man Co's cost of providing this data has been drastically reduced through direct customer access to Lo Man Co's computers.

b. Strategic Advantages

Building the long-term relationships between trading partners is the chief strategic advantage of EDI. As one executive put it:

"EDI gives your heart and soul to your partners—it develops and requires understanding and trust."

The information sharing inherent in EDI adds a significant value to the trading partner relationship. While this has tactical advantages, it also builds trading partner relationships in strategically important ways. One example is the assurance of supply in highly volatile or rationed markets:

- Trend/fashion merchandise has great volatility. Providing suppliers with a rapid indication of how well specific items are moving protects Mervyn's from lost sales resulting from out-of-stock situations.

- Computer chip demand is also quite volatile. By sharing its production and requirements forecasts with supplier Intel, Hewlett-Packard enabled Intel to more accurately plan its production and guaranteed HP a favorable position when demand outpaced capacity and Intel had to ration its customers.

Closer relationships can also help build market share by giving suppliers preferred treatment. Levi Strauss & Co. may be given more shelf space than a competitor if Levi's products have a higher turn rate due to the tighter inventory controls allowed by Levi's EDI system.

If a company takes a leading position in setting EDI standards for its industry, it gains another form of strategic advantage—greater control over the nature and pace of change.

- From both a systems and operations standpoint, it is better to be a leader than a follower, to dictate how things will work instead of "playing catch-up ball."

- Also, a firm's reputation and image is enhanced if it is viewed as an industry leader.

C
Characteristics of a Good EDI Candidate

The more of these characteristics that apply to a given firm, the better its chances for successfully implementing an EDI program. However, none of them is absolutely necessary, nor will the lack of any one of them make it impossible to go forward.

1. Characteristics of the Firm and Its Business

There must be a large number of distinct items to be managed and tracked—i.e., a broadly defined inventory problem.

There should be a few large-volume trading partners with which to start working and gaining experience. It is difficult to start out focussing on many small partners simultaneously.

There should be a significant cost or risk associated with out-of-stock or lost item situations. It also helps if such problems are difficult to identify and rectify before it is too late.

Firms with significant geographical dispersion (many and/or distant locations) can often benefit from both external and internal EDI.

Multidivisional, matrix, or complex organizational structures are often facilitated by an internal EDI system.

There must be a strong sense of corporate identity to encourage people to work together. An internally competitive environment brings about certain failure.

There should be a strong, service-oriented corporate culture that encourages forging long-term relationships with suppliers and customers.

2. Characteristics of the Industry

Industries which produce/consume/deliver a high volume of standard items are likely to have industrywide data standards already in place, facilitating the leap into EDI.

An industry with stable trade patterns (trading partnerships) has the kind of long-term cooperation required for success with EDI.

An industry in which there is a significant volume of business done between competitors (e.g., banking, transportation) is a likely candidate for standardization and EDI.

An industry with effective trade groups also evidences a pattern of cooperation that is helpful in setting standards.

The characteristics of a good candidate for EDI are shown in Exhibit II-3.

D

Key Factors in a Successful EDI Implementation

A successful EDI implementation requires specific attention to both internal and external factors.

1. Internal Factors

Top-down management support and involvement is crucial. Without it, EDI will be viewed as an intrusion by systems people into the affairs of everyone else, rather than as a key corporate strategy.

Every group that can possibly be affected by EDI should be permanently represented in an ongoing planning and decision-making process. (See the chapter on Hewlett-Packard for a good example of diversity in an EDI steering committee.)

Ensure that EDI is not viewed as a standalone project with its own justification, but as a tool to support other corporate functions. EDI should be justified, planned, and driven on the basis of how it can integrate with and support other corporate plans and strategies, such as just-in-time inventory systems.

Design EDI to work with diverse/decentralized company inputs. Do not require internal divisions to change their systems and operations to

EXHIBIT II-3

CHARACTERISTICS OF A GOOD
EDI CANDIDATE

Company	Industry
• A Broadly Defined Inventory Problem with High Cost/Risk of Stock Outs	• A High Volume of Standard Products
• Strong, Service-Oriented Corporate Culture	• Stable, Long-Term Trade Partnerships
• Complex, Geographically Dispersed Organizational Structure	• High Volume of Transactions between Competitors
• A Few Large Partners with Which to Initiate EDI	• Efficient Trade Associations

support EDI, but let their systems changes lead and integrate with EDI. This means a modular interface architecture, with many translation tables, routines, etc. that can be easily changed as interfacing systems are added or modified.

Establish a central group to implement and control EDI to build a "one company" image. Do not let individual units do EDI by themselves (i.e., set up their own systems and communicate directly with their own trading partners). One of the key advantages of centralized EDI is the consistent interface presented to the outside world. Independent efforts destroy this single-firm image.

2. External Factors

Become an active participant in all general and industry committees that are relevant to your use of EDI (ANSI, TDCC, VICS, etc.). These acronyms are defined in the Appendix B glossary.

Be aggressive in encouraging trading partners to participate. Sell them by using the arguments presented here.

Remember that your trading partners' top management support is as important your own management's support. Nothing will be accomplished unless both parties are committed at the highest level.

Provide trading partners with maximum possible support to implement EDI with you. Place heavy emphasis on orientation, education, and training, but also consider software/hardware support and implementation assistance.

These key factors in a successful implementation are summarized on Exhibit II-4.

EXHIBIT II-4

KEY FACTORS IN A SUCCESSFUL EDI IMPLEMENTATION

Internal	External
• Top-Down Management Support/Involvement	• Active Participation in Relevant Industry and EDI Groups
• Integration with Corporate Plans/Strategies and Participation by All Affected Areas	• Aggressive Encouragement and Support of Trading Partners
• Central Implementation Control	• Trading Partners' Top Management Support

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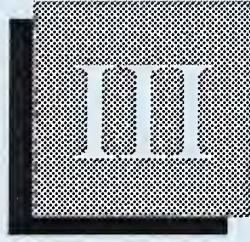
"International Logistics Management Company"

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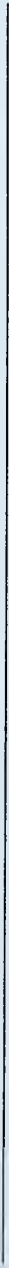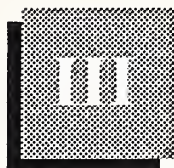
"International Logistics Management Company"

A
Corporate Background

International Logictics Management Company (Lo Man Co, or LMC) is the disguised name of a major international company. Operationally, Lo Man Co is divided into three units: International Transport Services (ITS), Domestic Transportation Services (DTS), and Transport Consolidation Services (TCS). Exhibit III-1 provides an overview of LMC's operations.

International Transport Services has served the trans-Atlantic trade for more than 120 years. A predecessor company inaugurated the first regular trans-Atlantic steamship service between North America and London in 1867. Lo Man Co is now one of the dominant carriers in the European/Mediterranean area, and the only one to dedicate its service exclusively to that market.

ITS's domestic counterpart, DTS, provides overland transportation services throughout North America. DTS's business includes both domestic and international shipments, and much of its international traffic is tied to APL's markets.

DTS consists of several entities that handle freight brokerage, rail and trucking.

- National Brokerage Services, Inc. is a major brokerage firm that manages more than 300,000 moves annually.

- Custom Brokerage Services provides just-in-time shipments for the automobile industry.

EXHIBIT III-1

LMC BUSINESS OVERVIEW

Net Revenue (1986)	$ 2.1 Billion
Clients	Approx. 40,000
Equipment and Facilities	
Ships (Container and Multipurpose)	30
Containers and Chassis	120,000
Terminals (ocean and inland)	250
Traffic Destinations	
Ports	100
Countries	30
Foreign Operations	
Regional Offices	10
Branch Offices and Agents	90
Terminals and Depots	80
North American Operations	
Regional Offices	8
District and Local Offices	60
Intermodal Service Points	150

- Intermodal Services Company manages rail cars used in the company's transportation system, maintaining operating agreements with a number of railroads and acting as a wholesaler of inland transportation.

- A fourth DTS subsidiary, National Trucking Company, manages the group's trucking services and equipment.

Transport Consolidation Services is the third leg of LMC's business. TCS takes small shipments that do not occupy a full container or rail car, consolidates them, and manages transportation to their final destination.

Lo Man Co is not just a collection of transportation companies. The phrase "international logistics management" expresses the major thrust of its corporate strategy—helping its customers improve the management of their logistics activities by providing them with a complete set of inte-

grated, high quality domestic and international transportation and distribution services.

- These services are not cheap. LMC is generally the highest-cost carrier in a given market.

- However, this higher direct cost is more than offset by the overall savings that customers achieve through tighter logistics control.

There are two key elements to LMC's quality control and transportation integration: LMC's facilities and its information systems.

- LMC has long been a leader in transportation technology and is one of the few shipping companies to design, maintain, and own most of its containers and chassis.

- ITS was one of the first companies to use cargo containers on ocean vessels and currently operates one of the most modern container fleets in the world.

- DTS pioneered served new rail and intermodal system concepts and operates one of the largest railcar fleets in North America.

- LMC has built an impressive network of efficient, modern cargo terminals for both ocean and overland freight.

Although other transportation companies may have more ships, containers, and other equipment, the combined facilities of the various LMC companies constitute one of the world's most extensive and sophisticated *intermodal* systems.

- Under the intermodal concept, ocean, rail and truck transportation are integrated under one carrier, with one through rate and one bill of lading from origin to destination.

- This integrated, intermodal system also provides a single central point of control for every phase of cargo delivery, allowing LMC to preplan cargo loadings, allocate equipment, and track ships, trains, containers and individual shipments throughout their journey.

All these facilities are coordinated through LMC's extensive computer and communications systems.

- The corporation's mainframe systems are accessible to ships, terminals, and offices throughout the world via satellite and direct lines.

- Through these systems, information about the status of equipment and shipments can now be updated and made available on a real-time basis to both LMC staff and customers.

B
IS Applications and EDI

The transportation industry is information intensive.

- A large amount of data is required at every point in the cargo's journey, and the carrier of record must generate and process many documents—especially in the case of international transactions.

- Much of the information in each document duplicates that on other documents pertaining to the same shipment.

LMC's objective for EDI is rather broad: a one-time, automated input that passes information to the appropriate applications and data bases, with no further or duplicate input of the same data ever being required.

- Prior to EDI, the basic procedure had been to key most of this data from source documents into a local computer at each point where new documents were to be produced.

- Each local computer then generated its own set of new source documents, and the data entry cycle repeated itself as the shipments moved from point to point in the network.

- There was also some shipment of computer tapes and floppy disks between major centers, so that already existing data would not have to be reentered manually.

Until 1986, LMC was not aware of EDI as such.

- A number of projects were underway in the Information Resources Department (IRD) that related to EDI, but they were undertaken without a conscious EDI focus.

- LMC's recent participation in developing the U.S. Customs Automated Manifest System was one of the first driving thrusts in recognizing EDI as a separate concept requiring specific focus and management attention.

Although a specific focus on EDI is relatively new to LMC, the use of information as a strategic asset is not.

- LMC considers itself to be a pure service organization and is always considering how it can add value to the basic service it renders its clients.

- Although LMC provides high-quality transportation, so do many of its competitors. The added value delivered by LMC is largely in the area of logistics information.

LMC customers need to know the location and status of their shipments —information that LMC also requires to manage its own operations.

- With more timely and accurate information, LMC can deliver faster and more reliable transportation while its customers save money through tighter shipment and inventory control.

- Recognizing this, LMC has taken a two-pronged approach to adding value by increasing the *quality* of its information base (accuracy, timeliness, coverage) while at the same time improving users' *access* to this data.

LMC has developed several methods of providing its customers with direct access to their shipment data.

- The LDA (Logistics Data Access) system allows customers to use a terminal or computer in their own office to access LMC computers, enter data, and inquire about the status of specific shipments.

- Query Link is a voice response inquiry system that operates from any touch-tone telephone.

- These systems were in development and operation long before the advent of EDI.

- Exhibit III-2 illustrates these customer data access methods.

EDI improves both the quality and accessibility of logistics data and is therefore an important addition to the electronic/information support that LMC delivers. However, LMC's overall strategy of providing top quality logistics management to its customers is based on a broad set of information processing capabilities, of which EDI is only one.

EXHIBIT III-2

LMC'S CUSTOMER DATA ACCESS

Data Bases

LMC Data Facilities

Logistics Data Access
(Terminal-Based
Status Inquiry)

Electronic Data Interchange

Query Link
(Voice Response)

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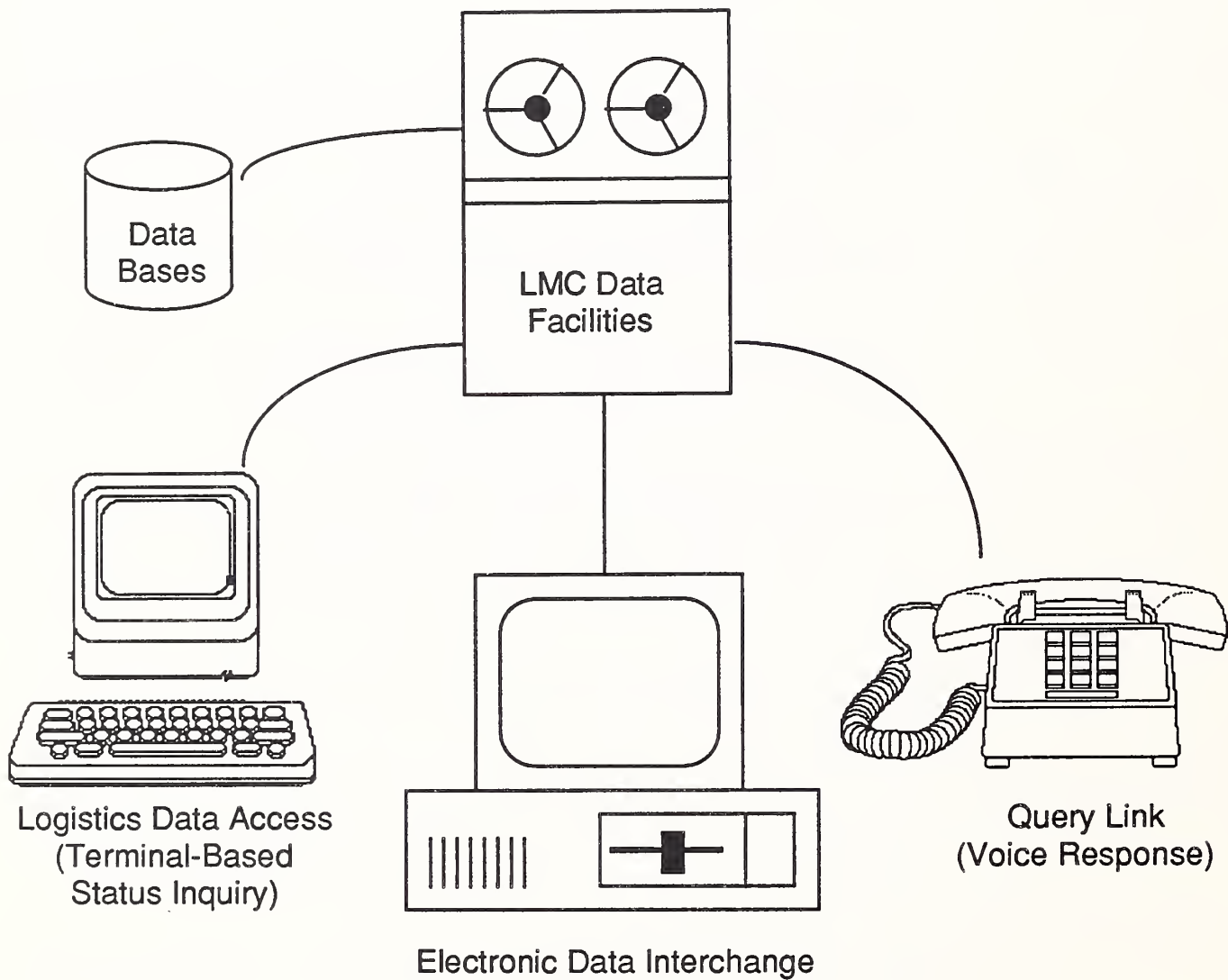
| History and Justification of EDI | LMC is one of the premier developers and appliers of technology throughout the shipping industry. |

LMC is one of the premier developers and appliers of technology throughout the shipping industry.

• Embracing and using technology is a major aspect of the corporate culture, and this philosophy is strongly driven from the top down.

• The CEO has been a major force in adopting IS technology, and it is easy to sell EDP applications internally.

- The biggest problem with IS and EDI is meeting the constant demand for more; justification has never been a real issue with EDI.

Although LMC started "doing EDI" before it recognized the concept, several market influences stimulated a more direct focus on EDI:

- Shipping industry deregulation allowed LMC to integrate the activities of its domestic (DTS) and international (ITS) units. Integrating LMC's internal information systems was a key step in achieving the economies of operation offered by deregulation.

- The U.S. domestic rail industry was a pioneer in using EDI, and DTS developed many customized links with the railroads that moved APD containers and railcars.

- Expanding customer interest in JIT (just-in-time) inventory systems created more frequent and diverse demands for EDI capabilities throughout the LMC organization.

- Both the U.S. Customs Service and the Department of Agriculture began to work with the shipping industry to develop EDI capabilities that would facilitate customs and health clearances.

- Finally, a large European manufacturer offered to make LMC the sole carrier for the firm's shipments of auto parts to the U.S.—if APL could provide an EDI capability within 3 months.

In short, as a service organization, LMC was being driven to provide EDI capabilities to its customers and suppliers. It soon became apparent that maintaining many different 1:1 links was neither feasible nor effective.

- In general, the suppliers of goods (the shippers) had the upper hand in determining the EDI standards to be used.

- As a service company, LMC was forced to accept its customers' demands, and most of its EDI applications were dictated to LMC rather than being initiated by LMC.

- It was finally recognized that the best way to solve this problem was through developing industry-standard approaches to EDI.

D
Development and Adoption of Industry Standards

Although LMC had been an early member of the Transportation Data Coordinating Committee (TDCC), its participation prior to 1986 was largely "window dressing."

- Though it encouraged the concept of electronic interchange, LMC was late in recognizing the value of standards and did not participate in many of the early standards-setting efforts.

- In addition, LMC's focus on European trade meant that a large part of its market was not actively pursuing standards, since European countries lag the U.S. in this area.

Now, however, European countries have become increasingly aware of the value of standards, and a number of them have started to adopt a set of standards for interface between freight forwarders and carriers.

In addition, LMC anticipates that the domestic railroad industry will adopt the TDCC standards for transportation data and X 12 standards for commercial data (invoices, etc.).

- LMC has therefore recently joined the X 12 committee and has started taking a leadership role in both TDCC and X 12.

- It also became an active participant in the U.S. Customs Service systems in order to ensure that the business interests of LMC and its customers were adequately represented.

E
EDI Plans and Goals

The company's ultimate goal is to get its customers to use LMC as their own distribution department, doing their distribution processing on LMC systems and having LMC handle the routing and rerouting of their shipments in "real time."

- This will require a significant extension of LMC's data processing capabilities coupled with a greater formalization of its EDI efforts.

- Recognizing this, LMC has developed a five-step program to achieve the desired integration:

1. Evaluate software products that are available to support EDI.

2. Evaluate third party-network and/or processing services.

3. Evaluate standards in place or proposed by various industry groups.

4. Determine which standards are required and/or likely to dominate.

5. Develop an architecture and process that will allow at least 80 percent of LMC's data input/output to be accomplished via EDI.

This program is being initiated in the first part of 1988.

• The objective will be to create a highly flexible, table-driven EDI interface that can work with a wide variety of customer systems.

• In addition, current LMC applications will be moved to the new architecture. LMC plans to market this system as an "EDI core product" and will develop a methodology to help its trading partners get up on the system.

• These plans and goals are illustrated in Exhibit III- 3.

LMC has set a target of establishing 200 EDI relationships in the first two years of its program.

• Although they have a few large customers and suppliers, these will probably represent no more than 10 percent of LMC's initial EDI relationships.

• Although these primary relationships will continue to be handled on a dedicated, 1:1 basis, the great majority will likely be handled via third-party mailbox services.

The strategy of putting LMC's capabilities in users' office locations has several advantages to both the user and LMC.

• One of the most important advantages is improving the quality, timeliness and accuracy of data.

• In addition to reducing data errors and inconsistencies between documents, this approach makes the user responsible for data accuracy, thus minimizing the problem of assigning responsibility for the consequences of bad data.

EXHIBIT III-3

LMC'S EDI PLANS

Software and Services Evaluation

Standards Evaluation

LMC Applications

An EDI System

LMC Applications

Customer Application

Customer Application
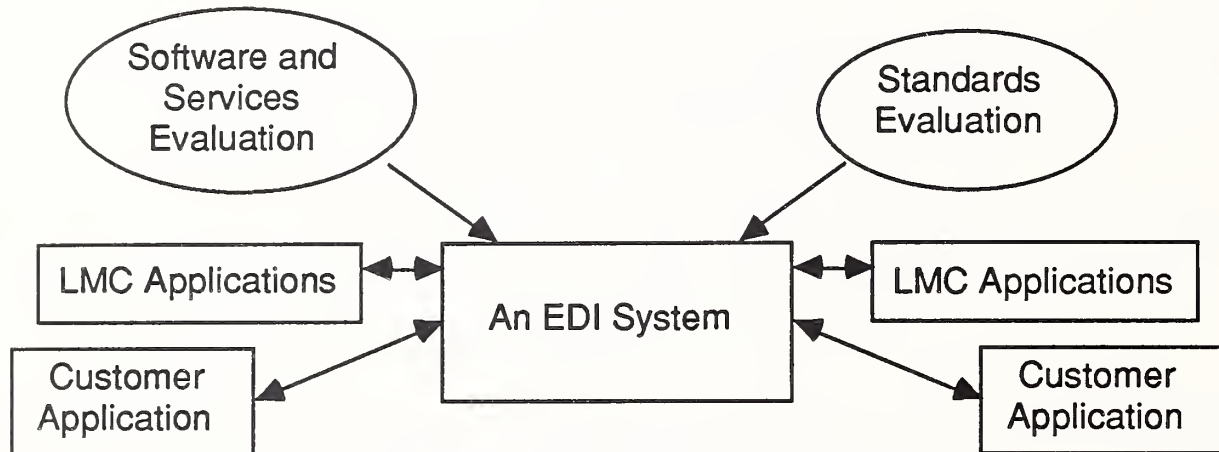
Goals: 1. Be Customer's Distribution Department

2. 80 Percent Input/Output via EDI

● Both LMC and users save money this way, and the user gets better service as a by-product.

The cost of this extra service to both LMC and the user is a critical strategy issue.

• Although there has been some minor deregulation of the transportation industry, it is still heavily regulated. One aspect of this regulation is that all services must be priced in the carrier's tariffs, at fair market value.

• Hence, LMC cannot give away hardware or software to its customers as an inducement to undertake an EDI program or to use LMC services.

• This is why LMC views EDI as a separate "core product," which must have maximum flexibility to accommodate the needs of many different users.

While LMC can command a premium price for its high quality transportation services, it recognizes that value-added services are not enough to lock in a customer during rate wars.

- As soon as the price discrepancy becomes too high, LMC's customers will switch to another carrier.

- Some of these competitive carriers are owned or sponsored by foreign governments and have the freedom to run at a loss or a subsidy.

- Therefore, LMC must carefully balance the costs and revenues associated with value-added services, such as EDI, and ensure that they do not create a fixed-cost burden that is unsupportable in a rate-war environment.

F
Management of the Implementation Process

Since EDI has never been a formal project at LMC, it never had a separate, formal justification, steering committee, or management.

- Individual EDI-related projects were usually justified based on their contribution to the overall strategy of maximizing value-added service to customers, as well as their potential for reducing internal operating costs.

- One of LMC's goals is to support increased growth without increasing head count. EDI applications are seen as an important element of this strategy.

EDI applications have been developed internally by IRD and were subject to the IRD project management process. A key element in this process is the role of the IR Directors.

- IR Directors are very high-level user/managers assigned to a business unit to support that unit in the application of technology to their business.

- IR Directors also serve as the business unit's primary interface to IRD.

Though IR Directors may deal with lower-level business analysts on specific issues, their primary mission is to provide management-level interaction with IRD.

- The seven IR Directors work together as a group to prioritize the overall corporate applications portfolio and allocate IRD resources to specific projects.

- Although there are some formalized steering committees that evaluate requests for new applications and approve major capital funding requests, the actual work is coordinated by the IR Directors.

The IR Director system is about two years old and seems very effective for LMC. User departments work well together, as the corporate culture places a premium on integrating LMC's capabilities to deliver customer support.

- No IR Director can remain in place for more than two years, so they tend to have a broad corporate perspective and understand the organization's problems.

- Although there have been some difficulties in accomplishing individual EDI implementations, the results have been uniformly good and there has been no significant internal or external resistance to EDI encountered thus far.

As the EDI program is formalized in early 1988, one of the issues will be how to organize and manage the effort. There will probably be a separate EDI group established within IRD to handle the design and implementation of the new architecture and systems.

- This group would also be available to users to help with the technical aspects of implementation.

- A parallel organization will probably be created in the marketing department to sell the concept and train customers to use the system.

The evolving EDI effort will significantly change the nature of LMC's data processing activities.

- IRD was previously buffered from clients by LMC staff and viewed itself as working to solve LMC problems. Now, the new IRD-EDI unit will have to work directly with clients.

- Since IRD will now be directly impacting clients, there will be a cultural change required—from an internal IS organization to an external IS organization. Accordingly, IRD will become more driven by client demands and less by LMC project priorities.

How the overall management of EDI might evolve remains to be seen.

- The IR Directors constitute an effective *de facto* IRD steering committee, and this system will probably continue in place.

- EDI might be looked upon as a new matrix business unit, with a new IR Director appointed to represent the application of EDI to the other businesses.

- In any case, it seems clear that the new focus on EDI will involve only minor changes in the relatively collegial and informal management style typical of LMC.

G
Summary and Recommendations

LMC's business strategy is to provide its clients with high-quality, value-added transportation services at a premium price. A key aspect of its business strategy is to always be ahead of its competition in technology, so that competitors are constantly forced to "play catch-up ball" and thus have no margin to leapfrog or surprise LMC.

Since shipment-status data is a major aspect of transportation services, LMC has been a leader in developing information systems supporting its own operations and those of its customers. Direct customer access to LMC systems has been a major aspect of this development effort, and LMC was "doing EDI" for some time before it actually focussed on the concept.

LMC was late in recognizing the value of EDI standards and just recently started to manage EDI as a separate activity. Nevertheless, it has had a good deal of success with its early "quasi-EDI" projects. Much of this success can be attributed to a corporate culture of strong teamwork and cooperation, coupled with a strong devotion to customer service.

Based on their experience with "doing EDI," the key observations that LMC management would share with potential users of EDI are:

- EDI will significantly change the role of marketing staff. Their work and capabilities are data driven, so EDI and other tools increase their analytical and problem-solving capacities.

- When you put your terminals and data bases into clients' hands, you are significantly changing the business relationship. All areas of the firm need to be aware of how these changes affect their operation.

- EDI increases the visibility of data base quality/integrity and will highlight bad fields and data areas that were previously overlooked.

- It is important to identify and separate operational and management processing requirements. They should not be combined in one program, data base, or machine. Rather, a separate set of data bases and machines should be established for management inquiry due to the different design criteria, development priorities, and funding allocation methods required by the two systems.

Exhibit III-4 summarizes LMC's observations relative to EDI.

EXHIBIT III-4

LMC'S EDI OBSERVATIONS

Marketing Staff Become More Analytical, Better Problem Solvers

Need Awareness of Changing Business Relationships

More Visibility of Data Base Quality/Integrity

Need Separate Operations and Management Processing

IV

Hewlett-Packard

IV
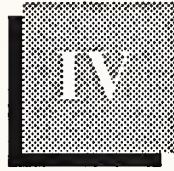
Hewlett-Packard

A
Corporate Background

Hewlett-Packard (HP) is a major international designer and manufacturer of electronic products and systems used for measurement and computation in industry, business, engineering, science, medicine, and education.

- The company employs over 82,000 people worldwide.

- In the 1987 fiscal year, HP had revenues of $8.1 billion and net earnings of $644 million.

- Exhibit IV-1 provides a more detailed set of statistics as of 1986, and Exhibit IV-2 shows HP's worldwide operations.

As these exhibits show, HP is highly diversified in a number of ways:

- Products and components produced
- Location and number of facilities
- Number and variety of customers and suppliers

HP's basic business purpose is "to provide the capabilities and services needed to help customers worldwide improve their personal and business effectiveness."

- From its inception, Hewlett-Packard has worked closely with its customers to provide high-quality solutions to complex problems.

- The culture and the systems of the company are dedicated to building strong and permanent alliances with all of its trading partners—customers and suppliers alike.

HP has always been a decentralized, entrepreneurial company. Before its reorganization in 1984, it was structured along the lines of its basic technologies.

EXHIBIT IV-1

HP BUSINESS OVERVIEW (1986)

Net Revenue	$ 7.1 Billion
Employees	82,000
Domestic	55,000
International	27,000
Product Line	
Catalog Products	11,805
Replacement Parts	281,000
Order Distribution	
Domestic	54%
International	46%
Market Diversification	
Measurement, Design, Info and	
Mfg Equip and Systems	42%
Peripherals and Network Products	25%
Service for Equip, Systems and Peripherals	19%
Medical Electronic Equipment and Service	7%
Analytic Instrumentation and Service	4%
Electronic Components	3%
Facilities	
Manufacturing Plants (15 countries, incl U.S.)	56
Sales/Support Offices and Distributorships	
Domestic	145
International (78 countries)	265
Annual Growth Rate (1981-86)	15%

EXHIBIT IV-2

HP'S WORLDWIDE OPERATIONS

☆ Corporate/Intercon Headquarters

☆ European Headquarters

◆ 466 Manufacturing Plants in 15 Countries and Sales/Support Offices in 79 Countries
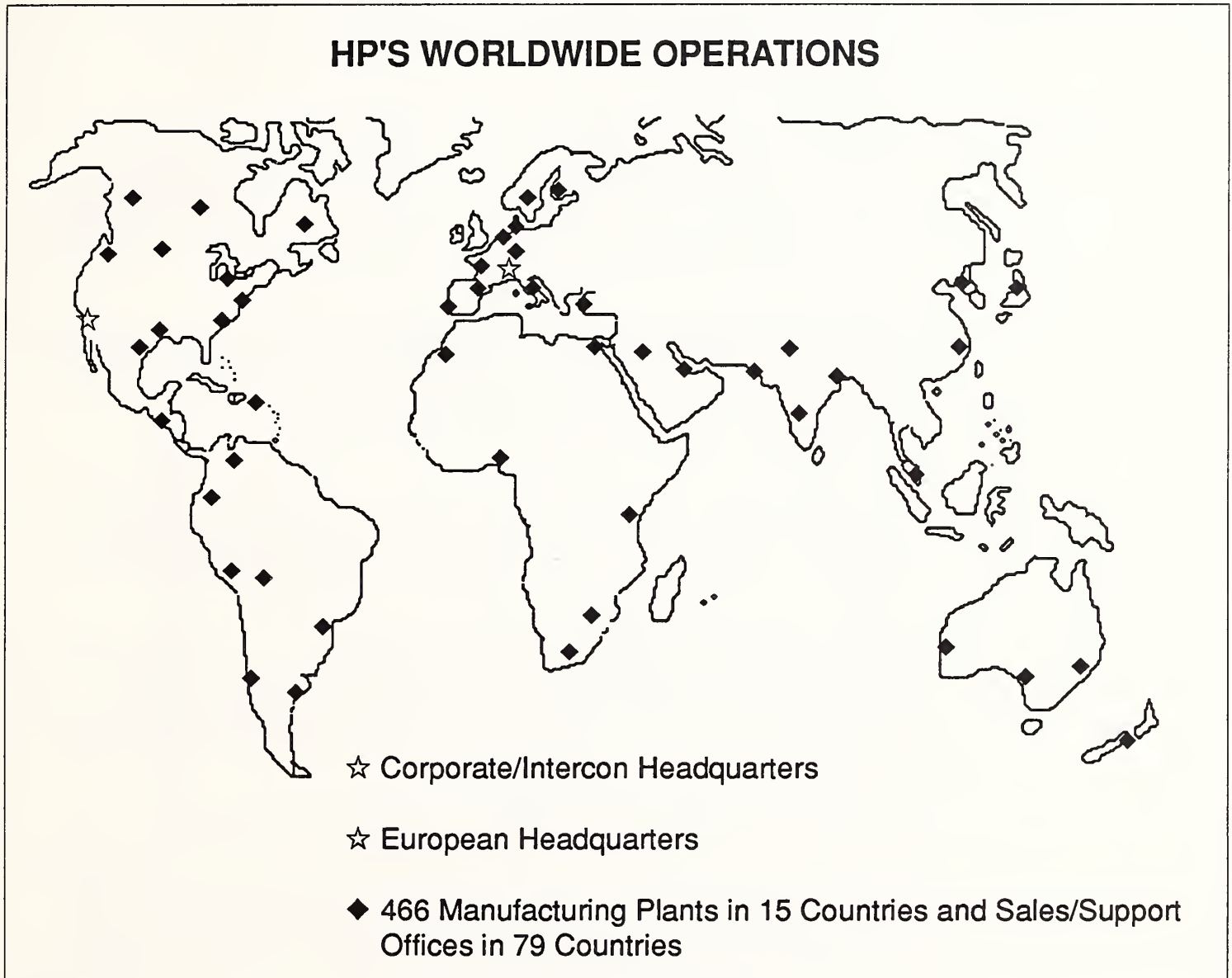
- Essentially, the company had two large groups—one for electronic instruments and another for computers, each with many subgroups dealing directly with the customer departments that used HP equipment.

- This approach kept the firm close to its customers, but only at a micro level. There was little synergy between different business units serving the same customer. The reorganization allowed the company to improve its overall service to customers by combining HP's expertise in its two basic technologies: measurement and computation.

HP is currently organized according to six areas of emphasis:

- Business Systems

- Engineering Systems
- Manufacturing Systems
- Test and Measurement
- Analytical Instrumentation
- Medical Products

These core businesses represent areas where HP could combine its variety of technical expertise to make a significant and distinct contribution to the marketplace. They are also businesses with significant internal linkages among the technologies, products, applications, customers, and distribution channels that they share.

Core business units are charged with defining customer requirements and providing solutions to meet those specific needs. Managers of the common linkages have responsibility for supplying the best products and services to meet the needs of the core business units.

The field sales and service organizations have undergone the same kind of matrix reorganization. In addition, marketing representatives from each of the core businesses were moved to the field to strengthen communication between the sales force and the product groups.

At the same time, the focus on broader business areas has brought HP into mass markets that it would have previously conceded to others. Effective competition in these markets requires centralized planning and marketing, high-volume production lines, and a high degree of capital investment.

All of these factors represent significant changes in the way HP has been managed in the past. Thus, while the reorganization has allowed HP to leverage its capabilities by combining them in many different ways, the additional linkages that were thereby created make today's HP a highly integrated and very complex company.

B

IS Applications and EDI

HP's administrative support functions were highly decentralized prior to the reorganization. Many locations and divisions had their own home-grown systems for basic applications such as order entry, inventory, invoicing, etc., and there were over 100 different forms of purchase order used by HP at the start of 1984.

Although HP's information systems are complex and decentralized, they are all linked together through ROUTS, the worldwide HP data network. EDI is viewed as a natural extension of the corporate reorganization, a mechanism for converting this simple connectivity into effective integration of the various information systems.

"EDI Central" (EDIC) is the technical arm of HP's EDI effort. EDIC deals with all inbound and outbound transmissions, serving as the one connection to ROUTS and the outside world and managing all the operational aspects of communication, security, and control.

Exhibit IV-3 is a schematic showing the relationship between HP users and EDI Central.

EXHIBIT IV-3

HEWLETT-PACKARD'S EDI NETWORK

C
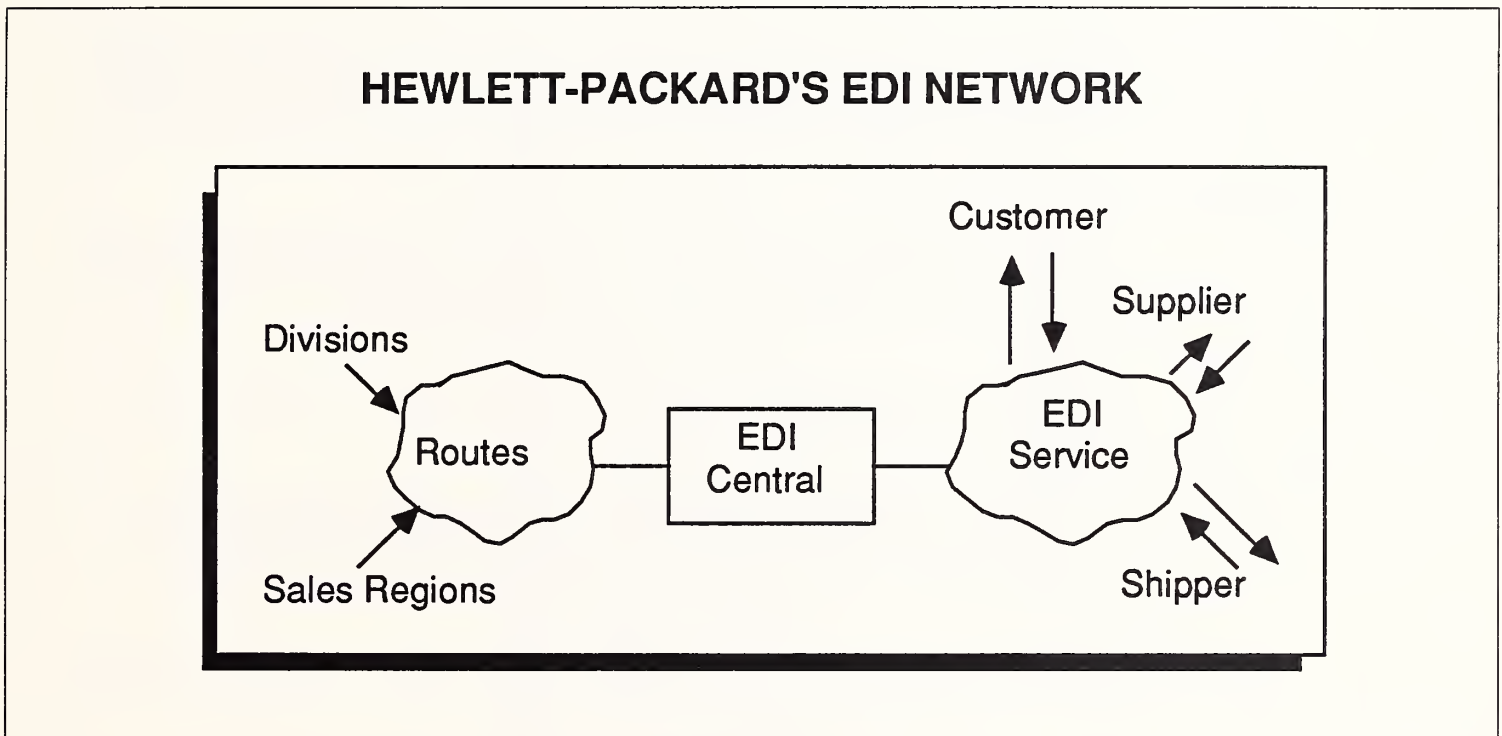
History and Justification of EDI

HP is involved in EDI activities with its suppliers, customers, and some transportation carriers. It is starting to exchange direct deposit and lockbox data with its bank, but does not yet move value, i.e., Electronic Funds Transfer, only data representing orders, acknowledgements, and other transactions.

The primary factor motivating HP's entry into EDI was improvement of its partner relationships, especially the levels of service it could provide both customers and suppliers.

- Though HP recognized that both sides would benefit from EDI, these costs and benefits were never separately analyzed or justified.

- Rather, costs and benefits were simply viewed as a part of the overall strategy of strengthening partner relationships.

During the early 1980s, when demand for computer chips exceeded supply, the industry operated in "allocation mode." Therefore, in 1983, HP's Materials Procurement Department (MPD) started on a program to improve its supplier relationships.

- HP recognized that EDI could help its suppliers shift production targets more effectively, thus assuring HP of getting the parts it needed.

- In fact, some HP divisions had already started their own small EDI programs with both suppliers and customers!

Within the overall process of improving relationships, HP also began to focus on the desirability of a one-company image with both customers and suppliers. EDI could clearly help here. Thus, it was not introduced as a foreign concept, but as part of an overall corporate strategy.

As part of the MPD relationship strategy, MPD management led a Steering Committee of Division representatives to define strategies, policies, and goals and to establish priorities for the EDI project.

- Exhibit IV-4 shows the makeup of the committee, and Exhibit IV-5 shows the goals they adopted.

- Top-level corporate approval of EDI was assured through MPD's management. This kind of coordinating committee approach is a normal part of HP's corporate culture and was accepted as such.

Though the costs and benefits of EDI were not separately monitored, the overall MPD program was.

- Expenses were being very carefully managed in the early 1980s, and new ideas, such as just-in-time inventory control and EDI, were all incorporated into the MPD strategy.

- In addition, it was recognized that the lack of standard systems and solutions was creating unnecessary administrative overhead in the Divisions. While each unit might still have to maintain systems related to its unique product line, a standard EDI process could eliminate much of this overhead.

D
Implementation Responsibilities

HP's corporate culture required that very few people be dedicated to EDI as such. The necessary support was each functional area's responsibility, and these responsibilities were integrated via the Steering Committee.

- However, a small EDI Administration Group was created as a satellite to the Steering Committee to provide the business units with nonparti-

EXHIBIT IV-4

HP's EDI STEERING COMMITTEE

Member	Representing
Lucie Cole	- Information Systems
Bob Adams	- Office Automation
Curtis Dare	- Telecommunications
Greg Larsen	- Marketing Systems
Chuck Marr	- Physical Distribution
Paul Lufkin	- Components Group
Bob Perreault	- Accounting Systems
Sandy Whitson	- Manufacturing
Dick Wilson	- Field Operations
Angelo Carlessi	- International
Allan Imamoto	- Consultant
Chuck Sieloff	- Consultant

san corporate support and day-to-day assistance in implementing the Steering Committee's policies.

- Training, documentation, and maintenance of the standards are among the Administration Group's primary functions.

The Steering Committee divided EDI responsibilities into three main areas:

- Strategic
- Technical
- Business

Strategic issues remained the responsibility of the Steering Committee.

EDI Central became the technical arm, with responsibility for developing and maintaining the core software and operating the gateways, subject to the guidance of the Steering Committee.

- It also developed a generic EDI contract and exhibit that can be used by any HP business unit and its trading partners.

- Essentially, EDIC's role is to be a supplier of core standards and tools, which can be used and modified by each business unit.

Individual business units were assigned the following responsibilities:

- Establishing the strategy for the functional (business) unit's use and integration of EDI

- Managing customer/supplier business relationships

- Developing interfaces between the core EDI system and the unit's own systems and applications

- Implementing the EDI program within the unit

- Maintaining the functional translators that interface with the core EDI system

These responsibilities are similar to the responsibilities business units have for their own IS functions. Decisions are pushed down to the lowest possible level, without imposition of any corporate requirements other than adherence to standards they participated in establishing.

E

Development and Adoption of Industry Standards

HP was an early and active member of EDI standards committees and is a strong supporter of the ANSI X12 standard.

- One HP staff member helped develop the Purchase Order format for the X12 group and is a key writer of the forecast/material release document.

- As on the Steering Committee, all areas of HP have been represented and participated in ANSI's work.

HP has also tried to encourage international standards setting, but this arena lags the domestic (U.S.) market in standards setting and actual EDI implementation. While the extent of its support for specific standards remains to be defined, as a multinational company HP recognizes that it must stand behind international standards development and views this as a "looming issue."

HP's EDI STEERING COMMITTEE GOALS

- Be among the Leaders in Our Industry in Implementing Electronic Data Interchange

- Increase Customer Satisfaction by Providing Electronic Order Processing Capabilities

- Present "One Company" Image to Customers/Suppliers via Common EDI Interaction Method across All Functional Areas

- Eliminate Duplicated Data Entry for Business Transactions

Although HP has taken strong public positions on standards issues, it tries to avoid the appearance of posturing or of railroading its own views. As one company executive put it:

"If you care how these standards are developed, participate in that development. It doesn't do any good to stand on the sidelines and say, 'they are doing it wrong,' because 'they' is 'us!'"

Which versions of a standard the firm will support becomes a major issue in an environment of rapid change, and it is important to establish this policy at the start of EDI implementation.

- Such policies are particularly important to a company like HP, where implementation responsibility is distributed across many business units that must all work through a single central gateway mechanism.

- The HP Steering Committee has decided to support the current standard, plus the last previous version.

- HP will also maintain a corporate data dictionary in a central location. This is consistent with the policy of maintaining key business codes in a central place while their modification and extension is delegated to individual business units.

F

Hardware/Software/Network Choices

As a computer manufacturer, HP is using its own equipment (HP 3000 series) for EDI. The basic EDI translator was purchased from Zellerbach, which had developed a proprietary application and made it available to HP. HP extended its functionality, adapting it to its needs.

At present, HP uses both GE Information Services' (GEIS) EDI*Express and McDonnell Douglas' (MDC) EDI*Net as EDI mailboxes. This store/forward capability is the only thing that HP uses these vendors for; all translation is done by HP systems.

EDI Central is responsible for making these choices and reviewing/changing them as EDI evolves.

• Though HP is open to using any other networks that can provide effective service, EDIC prefers to deal with as few vendors as possible.

• In the future, HP hopes that different network vendors will be able to interchange messages between themselves and HP can then work with only one vendor.

EDI security is not yet viewed as a significant issue by HP. Both GEIS and MDC have provided substantial assurances of the integrity of their systems. Also, the use of networks as mailboxes for procurement data requires less security than is required for moving money.

G

Management of the Implementation Process

The way HP assigned responsibilities for implementation assured that the project would be a success. The Steering Committee was quite successful in anticipating the problems and issues that might arise and was able to keep them from derailing the project.

The primary resistance encountered related to specific line items in business unit budgets.

• Managers asked, "Show me how this expenditure either helps my business or the company." Or they said, "I only have $150K to spend on this task—what are the benefits of my spending more?"

• This was not negativism, or a symptom of internal competition. Rather, it was a reflection of HP's management style and culture—a commitment to corporate goals coupled with a focus on spending money wisely.

The development of EDI was originally a mutual undertaking between HP and several of its major vendors. Now, some of HP's customers are asking to start an EDI relationship.

- Unlike the major auto companies, HP does not want to establish a unilateral relationship. HP will not lean on anybody—supplier or customer—to embrace EDI, nor will it force its own standards on its trading partners.

Engineering and analytic concepts are important to HP managers and to the management of HP's trading partners; they are a major ingredient of the industry's culture.

- HP recognized this, and the key way that HP motivated its partners was to educate them to the advantages of EDI.

- HP was also very open in sharing its technology and plans with its partners.

- The philosophy was "educate everyone—spread the gospel," both internally and externally.

- HP's partners learned how they would benefit from EDI, and no other incentives were necessary.

H
Summary and Recommendations

HP's business strategy is to develop strong partnerships with its customers and suppliers, and EDI is viewed as a tool to implement this strategy.

HP's overall management style is one of central policy guidance coupled with highly decentralized decision making. The EDI implementation project was planned and managed in this way, and it continues to prove itself a highly successful endeavor.

Key steps in this project were as follows:

- Form a Steering Committee to set policy and guidelines. Make sure that everyone affected is represented on the committee.

- Centralize EDI coordination.

- Establish a central communications gateway.

- Create a set of core software.

- Support decentralized business units in utilizing the core systems and implementing their own EDI strategies.

Based on their experience with this project, the key recommendations HP management offer to potential EDI users are:

- Approach EDI centrally, with a steering committee representing all affected areas.

- Participate actively in ANSI and industry standards efforts—"make friends with others who are in the same boat as you."

- "Put the horse in front of the cart—plan carefully!" Pay attention to secondary and third-order factors, not just the obvious issues.

- Educate everyone—spread the gospel.

These recommendations are shown in Exhibit IV-6.

HEWLETT-PACKARD'S EDI RECOMMENDATIONS

- Centralize Approach through Steering Committee

- Participate in Standards Groups

- Watch Secondary and Third-Order Issues

- "Spread the Gospel"

V
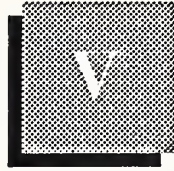
Levi Strauss & Co.

Levi Strauss & Company

A
Corporate Background

Levi Strauss & Co. (Levi's®) is one of the world's largest apparel manu-facturing companies. A public company until 1985, Levi's went private that year in a management-led leveraged buyout (LBO).

In its last years as a public company, Levi's had a broader view of its markets, considering itself a part of the "leisure-time industry." After stumbling in such a broad arena, the post-LBO management returned to the basics: manufacturing staple apparel for men, women, and children.

Exhibit V-1 provides an overview of Levi's current operations.

EXHIBIT V-1

LEVI STRAUSS & Co. BUSINESS OVERVIEW
(Data as of Year-End 1986)

Revenues	$ 2.7 Billion
Employees (worldwide)	33 K
Facilities	
Domestic	39
International	40
Customer Base	
Retailers	17 K
Outlets (stores)	200 K
Production/Distribution of Merchandise	
Pieces Shipped	160 M
Cartons Shipped	6 M

Levi's has built its reputation over the years on two basic factors: the consistency in design, style, and quality of its merchandise and the sales and merchandising services that it provides its retailers.

• This focus on service benefits both the retailers and Levi's.

• Anything that Levi's can do to improve its customers' sales helps Levi's sales; and anything that Levi's can do to improve its customers' inventory management helps Levi's with its own inventory management and production planning.

The current retailing environment is highly fragmented. Levi's sells to a wide variety of outlets, from the small local clothing store to large chains such as Sears and J.C. Penney.

• Each retailer has its own types of problems, and each has its own way of handling purchasing, inventory control, etc.

• Levi's is therefore asked to do business in a wide variety of formats with many different customers.

• In addition, each retailer buys merchandise from many different suppliers, all of whom have their own way of doing business.

• This has led to a situation in which the industry lacks good standards for electronic data interchange.

On the supply side, Levi's has less trouble. It purchases large volumes of raw material (fabric, buttons, zippers, etc.) but deals with only 30 to 35 mills and a slightly larger number of other vendors. The variety of items purchased is also far lower than the variety of products produced.

• For example, only five items (fabric, thread, zippers, buttons, and rivets) are required to make a wide variety of sizes and styles of jeans.

• Since most of Levi's products are staples rather than fashion or trend items, there is little danger that its raw materials inventory will become obsolete if there are changes in the demand for specific products or product lines.

• The logistics of dealing with these suppliers is therefore much less complex than the logistics of dealing with the retailer base.

B

Inventory Management in the Apparel Industry

The apparel industry has some unique characteristics that make inventory control difficult and provide a significant opportunity for improvement through the use of EDI. The first important distinction is between fashion, trend, and staple merchandise.

Fashion items are custom made in generally smaller lots on a one-time-only basis.

- After the retailer receives these items, they are placed on the selling floor. Hopefully they sell out. If not, they are marked down and flushed out of the store's inventory by the following season or year.

- These items cannot generally be reordered, so inventory control is limited to monitoring size/color sales for future ordering and to consolidate inventory as sales deplete certain sizes or colors at some locations.

Staple merchandise, by contrast, is made on a continuous basis over a long period of time.

- For the manufacturer, it is important to always be able to fill a retailer's order while at the same time minimizing the amount of finished product that must be stocked.

- The retailer also wants to feel confident that it will never run out of stock, but there is less concern that products will not eventually move.

- Other than as general promotions for the outlet, or to match a competitor's sale, there is generally little reason for a given store to mark down staple merchandise.

Trend merchandise fits in the middle.

- Though it can generally be reordered, its market life may be limited.

- Large retailers are especially careful not to jump on the bandwagon too early and get stuck with merchandise that is out of fashion by the time it arrives on their shelves.

- By the same token, if an item becomes a hot seller, the retailer wants to reorder it quickly. Manufacturers of trend merchandise have the double problem of having to meet highly variable demand while avoiding getting stuck with material that cannot be used for the same or other products.

Exhibit V-2 summarizes the inventory management requirements for these types of merchandise.

A second important distinction is in how inventory records are kept. SKU (stockkeeping unit) is the key.

- A single SKU represents a unique style, color, and size of garment.

- For a given style (e.g., Levi's 501 denim blue jeans) there may be 20 to 50 different SKUs, depending on the number of different size combinations that are produced.

EXHIBIT V-2

RETAIL INVENTORY MANAGEMENT
BY MERCHANDISE TYPE

Merchandise Type	Characteristics	Inventory Management Requirements
Fashion	Custom Made in Small Lots	Low—Not Generally Reordered
Trend	Limited Market Life	High—Variable Demand
Staple	Continuously Manufactured	High—Reorders Are Routine

- Manufacturing orders must be given by SKU, and finished goods inventory is also maintained by SKU.

For the manufacturer to do the best possible job of production planning, it is desirable to know the extent of retail inventories and how well the merchandise is moving at point-of-sale.

- All this data is needed at the SKU level.
- However, most retailers are not able to provide this data.

Especially in the smaller outlets, retail inventory and sales records are generally kept at the class/dept. level (e.g., number of men's jeans).

- This often results in out-of-stock situations for specific SKUs (sizes), even though there is a large quantity of the item on the shelves.

- Often this out-of-stock situation goes unnoticed, either because the customer does not ask for the specific SKU or the store has no way to record the inquiry at the SKU level.

The large and well-managed retail outlets recognized this problem at the same time that point-of-sale (POS) scanners and cash registers became available.

- A number of them adopted the new POS technology to make their checkout process more accurate and efficient.

- As an added bonus, these retailers were able to keep sales and inventory records at the SKU level.

- Having a better picture of sales trends and stock levels, these stores were then able to create more frequent and fine-tuned purchase orders.

- The next step was to transmit these orders electronically, and a few of the largest retailers began to develop their own proprietary EDI systems.

Since these retailers deal with many vendors, they were unwilling to accept the burden of implementing multiple vendor-specific EDI systems.

- Vendors were often told that use of the retailer's EDI system was a requirement for continuing the business relationship. Some firms were thus forced into developing a variety of incompatible EDI interfaces.

- Since the major retailers had the upper hand and wanted to develop their own proprietary systems, there was little initial push for standards from retailers and most manufacturers were so busy keeping up with their large customers that they had little time to consider how to get standard solutions developed and accepted by the industry.

Manufacturers saw three linked advantages to working with the retailers on EDI systems and quickly decided that these advantages outweighed the costs of supporting multiple systems.

- By reducing the number of out-of-stocks, both retailer and manufacturer realize higher sales and higher inventory turnover rates. Higher turnover rates make shelf space more profitable.

- In turn, higher shelf space profitability often leads the retailer to increase the space allotted to a vendor, thus further increasing the manufacturer's sales.

- For the manufacturer, this also translates to higher sales and market share since more self space leads to fewer out-of-stocks and therefore less shifting to a competitor's product.

Even without EDI, the same advantages were theoretically available for any retailers who did SKU-level record keeping. However, the cost of the systems was often prohibitive in comparison with the possible savings. There are three aspects to this record keeping:

- SKU-level item marking
- POS data capture at the SKU level
- A SKU-level data base to record inventories, sales history, etc.

With these three capabilities, a retailer could realize many benefits. The main value provided by adding EDI to these capabilities is the cost advantage of faster order entry and reduced paper handling.

- Although POS data capture and computer data base systems were standard items on the market, there were no generally used standards for SKU-level item marking.

- The retailer who wanted a SKU-level item marking system usually had to design and build it in house.

In most cases, the retailer did no item marking other than adding a price to the manufacturer's tag or putting a separate price sticker on the item. Some of the larger retailers did add POS scanner-readable tags to their merchandise—a few at the SKU level, more at the level of dept/class—but this was an added cost covered by their high business volume.

C
History and Justification of EDI

Levi's has a standard set of manufacturing applications, such as production management, order entry, shipping, and billing. Although Levi's does some nonstandard EDI with banks (e.g., direct deposits), the volume is not large. Nearly all of its EDI effort has been focussed on the customer base.

A few of Levi's largest customers had developed their own proprietary EDI format to use with their suppliers.

- Since few retailers are exclusive distributors of one manufacturer's line, Levi's agreed to comply with customers' requests for proprietary EDI.

- This led to a SWAT team approach of developing and implementing multiple EDI interfaces to Levi's own internal systems.

Although the multiple format approach was costly and awkward to manage, it provided Levi's with immediate advantages in providing better service to these large customers. However, it was obvious that this approach would not be effective in the long run.

- The SWAT team could not handle the same total volume of business that a standard approach would.

- Further, without a standard approach, most of the smaller retailers would not be able to use EDI.

In 1985, Levi's considered the problems of developing and marketing to its retailers a standard approach to EDI.

- An overall concept was developed that specified the benefits such a system might offer retailers and outlined an approach to marketing the system.

- In addition, the concept plan outlined the benefits that might accrue to Levi's if its customers adopted EDI.

As part of this concept development, Levi's did an extensive survey of its customers, asking them what problems they had and what features they might want in an EDI system.

- This was both a research and a marketing effort—determining how a system spearheaded by Levi's could help them.

- One of the primary benefits that Levi's attempted to quantify and market was the potential increase in inventory turns resulting from elimination of both overstocks and out-of-stocks.

In addition to the key benefit of improved sales and inventory management (both for the retailer and Levi's itself), it was also recognized that EDI would result in a significant reduction in paper and labor costs for both parties. This savings was quantified and included in the cost/benefit analysis for the system.

Several major requests emerged from the survey. Levi's was asked by its customers to do:

- EDI
- Preticketing
- Retailer-specific vendor marking

The last two requests reinforced the notion that industry standards were needed not only for EDI but for SKU-level product identification.

D
Implementation Responsibilities

After the surveys were completed, Levi's assembled its senior-level managers (national sales managers, division heads, etc.) to evaluate the results and develop a plan for a standard EDI system.

- In justifying the proposed system, all possible costs and benefits were included, with an indication of how accurate the estimates might be.

- The completed analysis and plan were documented in a white paper and presented to the CEO/COO.

The plan was approved as presented, and some specific strategic direction was given by the CEO/COO.

- As an extension of Levi's tradition of service to its customers, the new system (called LeviLink™) was to be aggressively promoted to those customers who could benefit the most.

- Levi's staff were also encouraged to participate actively in any and all standards-setting groups.

- The basic goal was to move the industry in the direction of standards, and the priorities were set based upon Levi's customer's requests.

Since this was basically an issue of relationships with Levi's customers, an EDI support group was created within the marketing area. This unit, at the time called Retail Electronic Services (RES) and EDI Services (EDIS), was staffed with three senior managers and chartered to improve customer relations and develop "EDI partnerships."

- EDIS was also given companywide responsibility for overall strategic direction of EDI projects throughout the various operating divisions and corporate groups.

- Implementation of specific EDI capabilities was left to the decentralized MIS units that supported the various operating divisions, with these MIS groups having a dotted-line reporting relationship to EDIS.

When EDIS staff went to talk with retailers, they targeted their meetings at senior executives in the buying organization.

- Although the retailers' MIS organizations were generally included in these meetings, the basic objective was to show the customers' management how EDI could help them increase sales and reduce inventories. Other areas of discussion included controlling orders, reducing merchandise handling, and cutting their paper and people costs.

- A parallel objective was convincing a customer's management that EDI was not just an MIS issue—that it was important to recognize EDI as enabling a fundamental shift in the way business was done, rather than just being another cost- or labor-saving application of IS technology.

For those retailers who already had their own proprietary EDI system, the pitch was: convert to standard formats.

E

Design and Marketing of EDI Applications

The decision to adopt standard EDI formats allowed Levi's to develop EDI applications as a standard product or service that could be offered to its retail customers. This had several advantages, including the ability to present a single image to the retailer.

- Interfacing with the proprietary systems of large customers meant that each of these customers required specialized individual support, while smaller customers were left out in the cold.

- With a standard system, Levi's could adopt consistent support procedures that would benefit the entire retailer base.

A second major advantage was that these EDI-based services could be easily expanded as retailers became more sophisticated in using EDI.

• By acting as both a product developer and service provider, Levi's could stay close to the changing needs of its customers and extend its system capabilities where the benefits would be greatest.

• This could be done at low cost since there was a single standard system to work with.

• Also, since these systems would be compatible with any other standard system, a retailer could add selected capabilities from the Levi's portfolio to an already existing system without significant cost.

A third advantage was that a standard system is easier than a proprietary system to sell to new and/or smaller users because they will eventually be able to use a standard system with other vendors, thus spreading the cost of acquisition over a larger base of business.

These advantages are summarized in Exhibit V-3.

EXHIBIT V-3

LEVI'S ADVANTAGES IN ADOPTING STANDARD EDI

• Single Image to Retailers

• A Platform for Additional Services/Systems

• An Easier "Sell"

One of the key selling points for adopting Levi's standard approach was the new dual technology Vendor Marking system it pioneered in 1985. This system featured both a Uniform Product Code (UPC) bar code and the National Retail Merchants Association (NRMA) Universal Vendor Marking (UVM) code on the product ticket.

• Both of these codes identify a product at the SKU-level (item, color, size, etc.), and both may be electronically read for direct updating of sales and inventory data bases.

- By premarking its products with both of these codes, in both scannable and manually readable formats, Levi's allowed its retailers to eliminate in-store ticketing except for price.

- Premarking also provided the retailer with accurate SKU-level product indentification.

- This both reduced the retailer's handling cost and allowed the retailer to move merchandise to the selling floor much faster than if in-store ticketing were required.

The original LeviLink system consisted of seven separate functions, with others to be developed and added as demand warranted. Some of these functions are performed by Levi's or on Levi's equipment. Others are handled by the retailer's own systems. These seven original functions are:

- Vendor Marking—done by Levi's at the finishing point of production.

- Model Stock Management—an analytical model run on Levi's systems by Levi's sales representatives. It uses the retailer's inventory, order, and sales data to create suggested future orders.

- Electronic Purchase Order—allows retailers to send purchase orders to Levi's, using either Levi's own product codes, UPC, or the NRMA UVM codes.

- Electronic Packing Slip/Bar Coded Carton Tags—shipping documents electronically transmitted, with corresponding scannable coding on each carton. Shipping documents specify carton contents at SKU level.

- Electronic Invoicing—from Levi's to retailer.

- Retailer Electronic Data Interchange Package (REDI)—a Levi's endorsed product offering complete inventory control/financial analysis and reporting for small to medium-size retailers. The product is purchased by the retailer, and includes POS equipment, bar code printer, terminals and computers. It runs on a personal computer or mini, captures POS information, and can be used for all products carried by the retailer (not just Levi's).

- Sell Through Analysis and Reporting System (STARS)—a marketing information service run on Levi's computers. Analyzes POS data to compute product profitability and identify fast- and slow-moving items by product, store, region, etc.

A recent major addition to LeviLink is the Retailers Inventory Valuation and EDI Transmission (RIVET) system.

- RIVET is a package developed by an independent software house that was modified for and endorsed by Levi's.

- It extends the capabilities of REDI to multiple stores, larger computers, and direct interface with a wide variety of equipment—cash registers, printers, bar code readers, etc.

- The complete package of equipment and software, together with an EDI linkage (if desired), is offered by AT&T and marketed in conjunction with Levi's.

How these services fit into the business process is shown on Exhibit V-4.

F
Management Directions for the Implementation Process

Levi's recognizes that it will live or die primarily on its products' cost and quality. However, it also sees EDI as a way to provide significantly better levels of service. By adopting a strong leadership role, it hopes to drive the market and be favorably measured against its competitors.

This leadership role is focussed primarily on management issues.

- Levi's believes that real competitive benefits will accrue to more effectively managed firms.

- This is the way Levi's is positioning itself—as a mainstream management leader rather than simply a specialized niche player.

In an environment with few standards and many large proprietary systems, there is sometimes a tendency for people to accept what is easy rather than what is best for the long term.

- As part of its leadership posture, Levi's is willing to go counter to industry standards if it thinks the industry is taking the wrong approach to a specific issue.

- However, most of its effort is spent on getting others to adopt the concept of standards rather than pushing for the adoption of a specific Levi's approach.

Levi's chose GE Information Services (GEIS) as its initial communications partner in LeviLink, viewing GEIS as the leader in the EDI field.

- GEIS has a reputation for trying to help everyone in the industry, and this aggressive support was a good match for Levi's own aggressive strategy.

- GEIS also has a record of high reliability, another of Levi's major service concerns.

EXHIBIT V-4

LEVI'S BUSINESS PROCESS

| Ticketing POS Capture |
| Vendor Marking |

| PAYMENT

Corporate Trade
Payment | MARKET ANALYSIS

STARS |

| INVOICE PROCESSING

Electronic Invoicing | INVENTORY REPLENISHMENT
- Model Stock Management
- Retail Electronic Data
Interchange Package (REDI) |

| PURCHASE ORDER
RECONCILIATION

Electronic Packing Slip | PURCHASE ORDER
GENERATION

Electronic Purchase Order |

| PHYSICAL RECEIPT
OF GOODS

Bar Codes on Carton Tags | PLANNING FOR RECEIPT
OF GOODS
Electronic Notices Order
Status Inquiry |

- Finally, GEIS' security system was considered very effective—there was concern about the problems of other companies dialing into Levi's systems.

As of mid-1987, Levi's was receiving over 20,000 purchase orders monthly in EDI formats.

- The retailers involved represented approximately one-third of Levi's business.

- Major retailers are now giving indicators that they see the benefit to moving away from their proprietary formats, and the volume of standard EDI is growing as more retailers hear about LeviLink.

- Nevertheless, it will require a large volume of usage over the long term if this effort is to be considered a success.

In the long run, one possibility is that store chains could eliminate warehousing entirely and have individual stores directly supplied from producers such as Levi's. This would be made much easier if the large stores adopted standard EDI, and this is one of Levi's current arguments in favor of eliminating proprietary systems from the marketplace.

G
Summary and Recommendations

Levi Strauss & Co. is one of the world's largest apparel manufacturing companies. Although it once had a broader product line and considered itself in the "leisure time industry," it has returned to its original business: manufacturing staple apparel for men, women, and children.

Levi's has built its reputation on two basic factors: the consistency in design, style, and quality of its merchandise and the merchandising and sales services that it provides its retailers.

- This focus on service benefits both Levi's and its customers.

- Anything Levi's can do to improve a retailer's sales helps Levi's sales; and anything that Levi's does to improve its customers' inventory management helps Levi's with its own inventory management and production planning.

The current retailing environment is highly fragmented. Levi's sells to a wide variety of outlets, from small individual stores to large chains such as Sears and J.C. Penney.

- One consequence of this fragmentation is that many large retailers have developed their own proprietary EDI systems with little concern for industry standards.

- As a result, the retailing sector lacks broadly accepted standards for data interchange.

Another reason for this lack of standards is the variety of ways retailers maintain their records. While large chains have invested in equipment and systems to track inventories at the SKU level (item, size, fabric, color, etc.), most retailers only keep records at the dept/class level. This results in many overstocks and out-of-stocks and makes inventory tracking and ordering a manually intensive operation.

In order to reduce its own costs of dealing with multiple proprietary EDI formats and to provide a service to its small and medium-sized customers, Levi's developed and marketed a set of industry (ANSI) standard systems under the name of LeviLink™. Levi's has taken an active posture in setting standards and is aggressively pushing the industry in this direction. Based on its experience with promoting EDI in the retailing arena, Levi's management made the following observations:

- EDI involves a significant amount of organizational change, and you cannot make this kind of change happen without the commitment of top management on both sides.

- You cannot just survey other industries to understand how EDI works. You must know your own industry's unique problems and characteristics and understand how they relate to EDI capabilities.

- Don't undertake an EDI program until you know your business and your marketplace and have a clear understanding of how EDI will help you and your customers/suppliers.

- Think of EDI as a means of helping you penetrate your marketplace. Try to find some key problem that your industry faces and see if you can solve that problem through EDI-related initiatives.

  - Vendor marking is the linchpin of EDI in the retailing industry.

  - Levi's marking system makes it much easier for any retailer to adopt EDI and manage its business at the SKU level.

- In addition to top management commitment, a great deal of cooperation is required at lower levels to make EDI work.

  - This is particularly important in situations such as retailing, where EDI requires a major change in the way the business is managed.

  - Product management at the SKU level is a new concept having major policy impacts that must be understood and agreed upon by many different functional areas.

• Have faith that people will wish to expand their use of EDI services once they try the first one (assuming that it is well managed). Most EDI-related applications are part of a continuous business cycle, and there is a clear advantage to integrating the parts of this cycle.

Exhibit V-5 summarizes these observations.
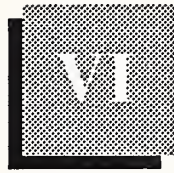
EXHIBIT V-5

LEVI'S EDI OBSERVATIONS

• EDI Means Change.

• EDI Needs Management Commitment and Cooperation.

• It's Important to Know Your Industry and Your Business.

• Use of EDI-Related Applications Will Grow.

VI

Mervyn's

VI

Mervyn's

A

Corporate Background

Dayton Hudson Corporation (DHC) is a growth-oriented retailing firm with nearly 500 stores in 34 states.

- One of DHC's four main subsidiaries is Mervyn's, a highly promotional, popular-priced, value-oriented department store that currently operates over 200 stores in 14 western and southern states.

- Mervyn's stores feature nationally branded and private-label apparel, accessories, and household soft goods.

- Exhibits VI-1 and VI-2 provide an overview of DHC and Mervyn's operations.

Dayton Hudson Corporation operates as a holding company and bank for its subsidiaries.

- Since each subsidiary operates in a different business segment, DHC treats them as autonomous operating companies and evaluates them all on standard measures such as earnings growth, ROI, etc.

- Though DHC feels that there is some synergy between its subsidiaries, it does not drive them to share operational data or processes, but such sharing is strongly encouraged and supported.

Mervyn's was founded in 1949 by Mervin G. Morris as a small (2,800 sq. ft.) soft goods store in San Lorenzo, California. By 1969, it had grown to five stores in the San Francisco Bay Area. That year, Mervyn's began an executive training program to provide the managers needed for an ambitious expansion program.

The company went public in 1971 and by 1975 had expanded to 26 stores with 4,230 employees generating $194 million in sales. Another stock

EXHIBIT VI-1

DHC BUSINESS OVERVIEW
(Data as of Year-End 1986)

Subsidiaries and Business Segments

Mervyn's—highly promotional, popular-priced, value-oriented department store chain

Target—upscale discount store chain

Dayton Hudson Department Store Company—two department store chains emphasizing fashion leadership, broad selections, and customer service

Lechmere—hardlines retailer

Revenues	$ 9,259.1 M
Compounded Growth Rate (1982-86)	15.0%
Operating Profit	$ 656.5 M
Stores	475
Retail Space (1,000 sq. ft.)	47,672

EXHIBIT VI-2

MERVYN'S BUSINESS OVERVIEW
(Data as of Year-End 1986)

		Percent of DHC
Revenues	$ 2,862.3 M	31
Compounded Growth Rate (1982-86)	16.5%	110
Operating Profit	$ 160.2 M	24
Stores	175	37
Retail Space (1,000 sq. ft.)	13,839	29

offering in that year allowed Mervyn's to expand its distribution systems, fueling another spurt of growth. By the time Mervyn's was acquired by DHC in 1978, it has grown to 51 stores generating $479.5 million in sales.

Mervyn's growth, both as an independent company and under DHC, has been based on a strong customer-oriented strategy of providing exceptional value and high-quality service to its largely middle-class market.

- To deliver this value and service in a growth environment, Mervyn's and DHC must stay on the leading edge of retailing technology, while maintaining a stable and consistent approach to managing a large and dispersed store network.

- One of the most important factors in achieving this consistent approach is Mervyn's Mission Statement (Exhibit VI-3). Each Mervyn's manager is responsible for understanding the details of the Mission Statement and adhering to the statement's Operating Principles (Exhibit VI-4.)

EXHIBIT VI-3

MERVYN'S MISSION STATEMENT

"Our mission is to achieve superior financial performance by consistently providing the consumer with exceptional value in soft-line general merchandise. Exceptional value is provided by the proper balance of quality, price, fashion, timeliness, and customer service. Superior financial performance is demonstrated by consistent long-range profit growth and a return on investment above the Dayton Hudson standard. We accomplish our mission through the meticulous execution of the Operating Principles."

Though other companies also have mission statements, Mervyn's statement is an unusually strong factor in the firm's culture. The corporate focus on profitability (2) and growth (3) is supported by a commitment to using effective systems (12) and a flexible management style (13) as tools to maintain productivity (14) in a rapidly changing environment (11).

MERVYN'S OPERATING PRINCIPLES

We are committed to:

1. Conducting our business with uncompromising honesty and integrity.

2. Achieving superior financial performance.

3. Becoming a national chain.

4. Preserving our merchandising identity.

5. Maintaining the strength and credibility of our promotional advertising.

6. Maintaining an appeal for the vast middle-American market.

7. Operating attractive and well-maintained stores.

8. Ensuring customer satisfaction.

9. Identifying, developing, and retaining people who demonstrate superior performance.

10. Providing a climate that encourages effective two-way communications between our company and our constituencies.

11. Retaining our flexibility and sense of urgency so we can effectively respond to changing conditions.

12. Using effective and innovative systems.

13. Continuing our unique interactive management style.

14. Maintaining high productivity in every phase of our business.

15. Supporting social and cultural programs which improve the quality of life in our communities.

- This combination of operating principles provides a high level of support to the firm's utilization of data processing and EDI technology as competitive tools.

- In addition, they demonstrate a strong commitment to building relationships with Mervyn's customers and other constituencies. This was a key goal of Mervyn's founder.

With nearly 200 stores in 13 states, distribution is an important factor in Mervyn's growth strategy.

- Mervyn's operates four large distribution centers (DCs) in California (2), Utah, and Texas.

- Each of these centers features state-of-the-art technology, equipment, and design to support just-in-time distribution of goods to the stores in its service area. Parameters of the recently opened Utah DC are outlined in Exhibit VI-5.

EXHIBIT VI-5

PARAMETERS OF MERVYN'S UTAH DISTRIBUTION CENTER

Cost	$ 20 M
Staff	420
Physical Dimensions	
Floor Space (sq. ft.)	300,000
Site Area (acres)	20
Receiving doors	29
Stores Serviced	40+
Merchandise processed (pieces/yr.)	100,000,000

B
IS Applications and EDI

To support its large, decentralized retail network, its four distribution centers, and its corporate functions, Mervyn's runs a wide variety of systems. Among the major applications are:

- Merchandise Processing
- Store Operating Systems (POS, etc.)
- Inventory Management
- Proprietary Credit
- Financial
- Human Resources Information (HRIS)

Most of these systems are heavily communications- and data base-oriented and run on IBM mainframes under IMS, although Mervyn's is switching to a relational data base system for future applications. Packaged software (e.g., MSA) is used for parts of the generic applications such as HRIS and financial systems, but most of the systems are home-grown and proprietary.

Mervyn's views EDI as an important aspect of nearly all these systems.

- In Mervyn's definition, EDI includes any form of electronic interchange between Mervyn's and its suppliers and financial partners, as well as the internal communications required between various Mervyn's units (e.g., stores and DCs).

- External electronic relationships include direct transmission of payroll data to banks, charge card authorizations and billing, credit bureau inquiries, etc., as well as the traditional merchandise order/shipment data passing between Mervyn's and its suppliers.

Rather than using third-party mailbox services, Mervyn's prefers to use direct communications in any case where it has a 1:1 relationship.

- Many of these 1:1 relationships require specific, unique interfaces, such as payroll deposits and credit card authorizations.

- Leased lines are used with a few of the largest key trading partners and in those situations where fast response is required (e.g., credit card). Leased lines are also used for nearly all internal communications.

- Otherwise, dial-up lines are used for periodic or small volume data transfer (e.g., payroll). Mailbox usage is reserved for 1:many situations, such as purchase orders.

Most networks use SNA, although there are a few older applications that still use Bi-synch or Asynch lines. Mervyn's is currently developing a strategy to move all EDI functions to SNA.

C

History and Justification of EDI

EDI was a part of Mervyn's systems architecture even before the concept was formalized. MIS identified data communications as a technology that would be of significant help in the future of the business, and everyone soon recognized its importance to both internal operations and trading partner relationships.

Mervyn's management considers logistics to be one of the most important applications a retailer can concentrate on to gain value from its activities.

- In a world of highly volatile trend and fashion merchandise, more rapid and extensive information sharing can significantly improve both retailer and supplier logistics management.

- However, the information sharing associated with EDI creates a strong mutual dependency between the trading partners—a situation which is initially uncomfortable to many firms.

Mervyn's was fairly aggressive in spurring its trading partners to adopt EDI. The initial pitch was a careful demonstration of the advantages that both parties would receive through more extensive information sharing.

- This pitch was reinforced by Mervyn's strong culture of relationship building and the large reservoir of understanding and trust that it had built up with its suppliers over the years.

Although it sometimes took a bit of effort to get suppliers on board, they were usually convinced by the fact that, if they made the investment with Mervyn's, the systems could also be used with other retailers.

Meanwhile, Mervyn's felt that it was achieving a competitive advantage with its suppliers vis-a-vis other retailers by not only sharing important data with them but helping them develop a new, leading-edge capability.

Managing Mervyn's internal logistics was the other primary justification for EDI.

- Instead of the traditional predistribution system in which a buyer designates per-store shipment quantities when a manufacturing order is placed, Mervyn's has adopted a postdistribution strategy in which the buyer simply designates a total quantity of items to be produced.

- Several weeks before the manufacturer's shipping date, an analyst specifies how the order is to be allocated among the four Distribution Centers.

- After the merchandise is received by the DC, the analyst reviews store inventory levels and stock turnover rates and determines how much to send to each store.

Though this system provides great savings through tighter inventory control, it is only feasible with large and sophisticated DCs supported by extensive data bases.

D

Development and Adoption of Industry Standards

In addition to quickly recognizing the value of communications technology, Mervyn's MIS organization also saw that standards would be required if the technology was to fulfill its potential. The importance of standards was easily understood by Mervyn's management, and the MIS unit was encouraged to pursue the development of appropriate industry standards. At the same time Mervyn's parent, DHC, also became interested in EDI and encouraged subsidiaries to participate in standards-setting activities.

- DHC assumed the responsibility to represent overall corporate interests on VICS—the Voluntary Inter-Industry Communications Standards, a committee developing EDI standards between retailers and manufacturers.

- The subsidiaries were asked to work with more-specialized industry and user committees.

- Mervyn's joined ANSI and rapidly became an active and driving force in X12 and other committees in the retail area.

Mervyn's also worked hard selling its suppliers on the importance of a standard approach to EDI. However, it often found more resistance to EDI itself than to the adoption of specific technology standards.

- The vendors' greatest concern was that EDI would let computers bypass the salespeople, thereby diminishing their control of the account relationship.

- Mervyn's countered with the argument that the salesperson is now only an order writer, but with EDI support he or she would be able to provide better service, spend more time addressing customer problems, and have fewer headaches in the process.

- Vendor reluctance to change the salesperson's role may have been motivated more by salespeople's fears of lost commissions than by concern with trading partner relationships.

- Whatever the reason, the hardest industry standards to change have revolved around people, not technology.

E

Management of the Implementation Process

Since EDI capabilities were a basic part of the applications architecture, Mervyn's did not establish a separate, formal EDI steering committee. Instead, the initial EDI efforts were treated as a separate project and approved by the MIS steering committee, with long-range strategic benefits being the principal justification.

- The initial EDI project included development of an overall EDI strategy for Mervyn's and the implementation of a pilot application.

- Following the success of the pilot project, EDI capabilities were embedded in all new applications.

- In addtion, an EDI add-on project was established to retrofit older applications with EDI capabilities.

Although the EDI pilot and EDI add-on projects were separately justified and managed via the MIS steering committee, the pilot demonstrated the value of EDI as a tool that contributed to Mervyn's overall strategy of relationship building and improving logistic system management. Therefore, the EDI component of all new applications is included in the applications' overall justification.

Mervyn's decided that it would be hard to stay on the leading edge of EDI if it tied itself to software vendors whose basic priority was to support "plain vanilla" capabilities for a broad spectrum of users. It therefore decided to develop its EDI systems in-house, using the same management process that was applied to other IS projects.

Mervyn's views technology as a tool in the operation of its business—as a competitive weapon.

- Management's focus is on business issues rather than technology.

- There is a conscious effort to demystify IS and other forms of technology within Mervyn's, and all top executives can discuss the company's IS architecture and strategy.

The user base is heavily involved in everything that the MIS group does.

- All projects are led by a Project Control Chairman (PCC), a user/sponsor who is responsible for the outcome of the project.

- The user is the basic driver of the project, with the MIS group serving as a general contractor to guide and support the implementation.

- Viewed another way, MIS drives the process while the user is responsible for the implementation.

Each functional area is viewed as a "pyramid."

- Each pyramid has a key user manager in charge of that area's applications portfolio.

- Functional area heads are responsible for prioritizing applications within their own area, and these priorities are changed only once a year.

- Approximately 20 percent of the MIS group's resources are devoted each year to enhancements of existing applications, and users must also prioritize these enhancements within the budgeted level of effort.

An MIS Steering Committee establishes overall corporate priorities among applications in various user pyramids. This Steering Committee is composed of the CEO/President, the CAO, and the VP of MIS.

- Five different models are used by the Steering Committee to evaluate the justification and benefits of all applications and compare them on a priority basis.

- These models are:

    - Value Chain
    - Competitive Analysis
    - Strategic Grid
    - Net Present Value
    - Systems Architecture

Because systems planning and implementation is strongly user driven, there has been no internal resistance to the implementation of EDI.

- In addition, a major aspect of the corporate culture is that Mervyn's never misses its commitments and works to maintain a high level of credibility with its trading partners.

- Fighting EDI would impact these commitments and would therefore run strongly counter to the firm's culture.

All MIS projects have a semiformal link to the budget process to track implementation progress. In addition, postimplementation audits are conducted by the corporate auditing staff as a normal part of their audit program.

- The high level of user control over systems projects tends to inspire them to join the MIS group in taking risks on new concepts and new approaches to applications.

- The strong partnership between user management and MIS provides a constructive environment for applying innovative techniques such as EDI, and this combination of risk-sharing and "no surprises" management ensured that overall project delivery is not impacted by such innovation.

In addition to getting its own user management involved in EDI projects, Mervyn's believes that it is equally important to get the top management of its trading partners involved in any joint project.

- Mervyn's hosts several conferences each year to help educate its trading partners to the concept of EDI.

- These one-day conferences include presentations by senior Mervyn's executives as well as speakers from firms currently using EDI to support their trading link with Mervyn's.

In addition to these high-level conferences, Mervyn's technical staff is available to help its partners address specific implementation problems. Beyond this, Mervyn's does little to support its trading partners.

- Its approach is to combine education and leverage to convince its partners that they should get involved in EDI.

- Mervyn's takes the position that EDI is an important part of its business strategy, and its partners must follow this strategy in order to maintain the relationship.

F
Summary and Recommendations

Mervyn's is a highly promotional, popular-priced, value-oriented department store that currently operates over 200 stores in 14 western and southern states. The company is strongly expansion minded and plans to open new stores at a compound annual growth rate of 16.5% through 1989.

Mervyn's management is aggressive in its use of technology to improve the efficiency of its operations. Physical technologies, such as automated warehouse systems, are seen as an extension of information technology, and many of the firm's MIS applications support physical operations.

Mervyn's sees logistics management as the most significant challenge and opportunity for a retailer to provide added value to the merchandise it sells. Innovations, such as just-in-time distribution, have been a major factor in improving merchandise availability and inventory turn ratios.

EDI capabilities have been a part of Mervyn's systems architecture for many years, and the firm has extensive data interchange with suppliers and financial partners (banks, credit card processors, etc.). It also uses EDI technologies internally to handle the operation of its stores and the delivery of merchandise to and from its Distribution Centers.

Mervyn's makes its user departments responsible for the success of their own systems development projects. The MIS organization serves as a general contractor to the user, providing resources and managing the development process. This arrangement means that users are committed to their projects, and resistance to EDI has therefore never been a problem.

Based on their experience with selling the concept of EDI to their trading partners, Mervyn's management made the following observations:

- EDI should be viewed as a linchpin to make other things happen: just-in-time/quick-response inventory systems, etc. Do not try to justify EDI solely on the direct savings it may produce as a substitute for paper-based processing.

- EDI will not succeed without top management commitment on both sides. It is critical to get the support and involvement of your trading partners' top management if the EDI effort is to succeed.

- Education is the next-most-important factor in successfully selling and implementing EDI.

- EDI is a matter of details, and everyone from the top down must focus on these details; great visions and grand commitments are not enough.

- Finally, planning is the most important factor in ensuring the success of any kind of project—EDI, systems, or other. Remember the "5 Ps":

Prior   Planning   Prevents   Poor   Performance

Exhibit VI-6 summarizes Mervyn's EDI observations.
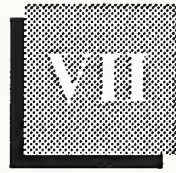
EXHIBIT VI-6

MERVYN'S EDI OBSERVATIONS

- EDI Is a Linchpin to Other Systems

- Both Trading Partners Need a Management Commitment

- Education and Attention to Details Are Critical

- Prior Planning Prevents Poor Performance

VII

Conclusions and Recommendations

VII

Conclusions and Recommendations

A

Summary and Conclusions

This report has described the experiences of four firms who are on the leading edge of EDI implementation. Though the industries represented are quite different—electronics manufacturing, apparel manufacturing, retail distribution, and transportation—there are striking similarities in the overall business strategy of each of these firms, as well as in their approach to implementing EDI.

These four case studies emphasize the *management issues* involved in EDI implementation.

- Each of these firms has become a leader in solving the technical/ standards issues associated with EDI, and that leadership has been a significant part of their management strategy. But their primary focus has been on changing the way their industry operates.

- By capturing this kind of a leadership role, these companies have developed a strategic industry position that is far more important than any direct cost benefits associated with EDI.

The following paragraphs present a brief overview of the studied companies and illustrate how EDI fits in with their business strategies:

1. International Logistics Management Company (LMC)

International Logistics Management Company (LMC) is the disguised mame of a major international transportation company, the dominant shipping company in its primary market area and a large factor in domestic intermodal (truck/train) shipping.

LMC's business strategy is to provide its clients with high-quality, value-added transportation services at a premium price. A key aspect of its strategy is to stay ahead of its competition in technology, so that competitors are constantly forced to "play catch-up ball" and thus have no margin to leapfrog or surprise LMC.

Much of LMC's business success can be attributed to a corporate culture of strong teamwork and cooperation, coupled with a strong devotion to customer service.

Shipment status data is a major aspect of transportation services, and LMC has been a leader in developing information systems to support its own operations and those of its customers. Direct customer access to LMC systems has been a major aspect of this development effort.

2. Hewlett-Packard (HP)

Hewlett-Packard (HP) is a major international designer and manufacturer of electronic products and systems used for measurement and computation in industry, business, engineering, science, medicine, and education.

HP's business strategy is to develop strong partnerships with its customers and suppliers, and EDI is viewed as a tool to implement this strategy.

HP's overall management style combines central policy guidance with highly decentralized decision making by market-focussed product divisions.

Although HP wants to maintain a one-firm image to the outside world, each division has direct dealings with its own suppliers and customer base. The EDI project was planned and managed with this management style in mind and has been a significant success for HP.

3. Levi Strauss & Company (Levi's)

Levi Strauss & Co. is one of the world's largest apparel manufacturing companies, manufacturing staple apparel for men, women, and children.

Levi's has built its reputation on two basic factors: the consistency in design, style, and quality of its merchandise and the merchandising and sales services it provides its retailers. This focus on service benefits both Levi's and its customers: anything Levi's does to improve a retailer's sales helps Levi's sales, and anything that it does to improve customers' inventory management helps its own inventory management and production planning.

In order to solve the problems of dealing with multiple proprietary EDI formats that had developed in this fragmented industry and to provide a service to its small and medium-sized customers, Levi's developed and marketed a set of standard (ANSI) EDI systems under the name of Lev-iLink. Levi's has also taken an active posture in setting standards and is aggressively pushing the industry in this direction.

4. Mervyn's

Mervyn's is a highly promotional, popular-priced, value-oriented department store that operates over 200 stores in 14 western and southern states.

Mervyn's management is aggressive in its use of technology to improve the company's operational efficiency. Physical technologies, such as automated warehouse systems, are seen as an extension of information technology, and many MIS applications support physical operations.

Mervyn's sees logistics management as the most significant challenge and opportunity for a retailer to provide added value to the merchandise it sells.

• Innovations such as just-in-time distribution have been a major factor in improving merchandise availability and inventory turn ratios.

• EDI capabilities have been a part of Mervyn's systems architecture for many years, and the firm has extensive data interchange with suppliers and financial partners.

• It also uses EDI technologies internally to handle the operation of its stores and the delivery of merchandise to and from its Distribution Centers.

There are several important similarities that have enabled these companies to be successful in their application of EDI.

• All of them have a strong orientation toward customer service and teamwork—internal competition is not a problem.

• All have a strong orientation toward building long-term, stable relationships with their trading partners—partnership is a real and meaningful aspect of their business.

• All of them have a corporate culture in which everyone from the top down actively embraces the use of technology as a competitive tool.

• All are active and public leaders in their industries, willing to go out on a limb and push new ideas and ways of doing business.

• All of them recognize the importance of planning and education and work hard to ensure the success of any project they tackle.

These similarities are summarized in Exhibit VII-1.

B
Recommendations

In addition to the similarities in their backgrounds and experiences with EDI, our subject companies had similar observations on how to approach the implementation of an EDI capability. These observations may be grouped into the following four themes:

EXHIBIT VII-1

CASE STUDY SIMILARITIES

- Customer Service and Teamwork Oriented

- Technology Seen as a Competitive Tool

- Innovative Industry Leaders

- Recognized the Importance of Planning and Education

1. View EDI as a Linchpin to Make Other Things Happen

EDI should not be analyzed or justified solely on the direct savings it produces as a substitute for current processing systems. Rather, it should be looked at as a tool that enables new business strategies to be implemented. For example:

- Just-in-time inventory systems
- Elimination of warehouses
- Direct customer inquiry/input

These strategies use EDI as a competitive weapon, positioning the firm as a leader in the industry and helping it penetrate the marketplace by providing new solutions to old industry problems.

EDI and new business strategies should also be viewed in the context of the industry's overall operating cycle.

- If the implementation is well managed, it will soon be clear that most EDI-related applications are part of a continuous business cycle and that there is a clear advantage to integrating parts of this cycle.

- Though it may be hard to get people "on board" the first time, the pioneering firm should have faith that its trading partners will want to expand their use of EDI services once they try the first one.

2. Look Carefully at How EDI Will Affect Your Business Relationships

Don't undertake an EDI program until you know your business and your marketplace and have a clear understanding of how EDI will help you and your customers/suppliers.

- You cannot just survey other companies to understand how EDI works.

- You must know your own industry's unique problems and characteristics and understand how they relate to EDI capabilities.

For example, when you put your terminals and data bases into clients' hands, you are significantly changing the business relationship.

- All areas of both firms need to be aware of how these changes affect their operation.

- Marketing staff provide a good illustration. Their work and capabilities are data driven, so EDI and other IS tools increase their analytical and problem-solving capacities and allow the firm to provide a higher level of customer service.

3. Top-Down, Firmwide Commitment Needed for Success

EDI involves a significant amount of organizational change, and you cannot make this kind of change happen without the commitment of top management on both sides.

- It is critical to get the active support and involvement of your trading partners' top management if the effort is to succeed.

- In addition, a great deal of cooperation is required at lower levels to make EDI work. This is particularly important in situations such as retailing, where EDI requires a major change in the way the business is managed.

EDI is also a matter of details, and everyone from the top down must focus on these details; great visions and grand commitments are not enough. To ensure that nothing "falls through the cracks," it is best to approach EDI centrally, managing the project through a high-level steering committee representing all affected areas.

4. Along with Commitment, Planning and Education Are the Keys to Success

As one interview subject said, "Put the horse in front of the cart—plan carefully!"

- Pay attention to secondary and third-order factors—i.e., to the details, not just the obvious issues.

- Educate everyone—spread the gospel.

- Remember that planning is the most important factor in ensuring the success of any project—EDI, systems, or other. Remember the "5 Ps":

Prior   Planning   Prevents   Poor   Performance

These recommendations are summarized in Exhibit VII-2.

EXHIBIT VII-2

EDI RECOMMENDATIONS SUMMARY

- Don't Justify EDI Alone—It's a Linchpin for New Strategies

- Evaluate How EDI Impacts Business Relationships

- Top-down Commitment Needed

- Planning and Education Are Key

In addition to these basic themes, the following points were strongly emphasized by one of the managers interviewed:

- EDI increases the visibility of data base quality and integrity and will highlight bad fields and data areas that were previously overlooked. This is a double-edged sword—it will make the project look bad at first but will be a great help in improving the long-run overall quality of a firm's information systems.

- It is important to identify and separate operational and management processing requirements. They should not be combined in one program, data base, or machine.

  - Rather, a separate set of data bases and machines should be established for management inquiry.

  - This allows data base cleanup and integrity issues to be separated from ad-hoc, quick-and-dirty reporting issues and provides the most effective environment for expanding EDI activities.

Finally, everyone interviewed emphasized the importance of participating actively in ANSI and industry standards efforts. "The best way to solve the problems is to make friends with others who are in the same boat as you."

Though each firm and industry has its own unique set of problems associated with EDI, INPUT believes that following the above recommendations will help minimize the problems and maximize the success of any EDI effort.

A
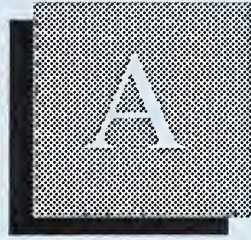
Appendix: INPUT EDI Case Study Outline and Questions
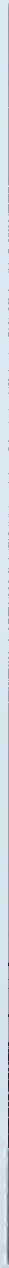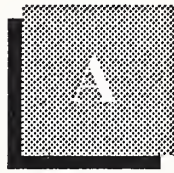
Appendix: INPUT EDI Case Study Outline and Questions

A
Application Description

A-1. Functional Business Description

A-2. Company Business Parameters (sales, employees, locations, etc.)

A-3. IS Applications
- Internal
- External/Interface
  - peer
  - self-supplied (generally downstream)

A-4. EDI Description/Overview (who with, what types of data)

➔ Do you have any schematics, diagrams, or charts that would help understand the approach you've taken to EDI?

➔ What types of trading partners are involved?
. Suppliers
. Customers
. Transportation carriers
. Banks
. Others

B
History/Justification of EDI

B-1. Why—what was the impetus to look into EDI?

➔ How did it first come up?

➔ What were the key/primary motivators?
. Trading partner pressure
. Cost savings
. Inventory control
. Customer service

B-2.   How was it justified?

→   What were the "hard" (tangible/quantifiable) benefits?

→   What were the "soft" (intangible/quality) benefits?

→   Who received these benefits?

→   How were the time and expense of development traded off against the benefits?

B-3.   Describe the analysis/decision/steering process.

→   Was there a task force or study group formed?
     If so, who was represented on the group?

→   What was the process used to analyze costs and benefits?

→   What was the process used to arrive at decisions regarding implementation/priorities/etc.?
     . Who participated?
     . How was the process steered/managed?
     . What levels of review/approval were required?
     . How were decisions communicated/sold to participants?

B-4.   Describe your participation in industry standards setting, steering committees, user groups, etc.

→   What groups were involved?
     . Who from your company participated?
     . What groups did you participate in?
     . How were these choices made?

→   Was your participation active or passive?

→   Did your firm take public positions on issues, or was your role and activity not publicly discussed?

→   How did your participation influence decisions regarding your own EDI program?

C

Implementation— Technology Choices

C-1.   What kind of hardware are you using, and why?

→   How did you choose between micro/mini/mainframe?

→   How did you choose vendor?

C-2.   What kind of software are you using, and why?

→   How did your hardware/software choices relate—which was the driving force: hardware or software?

➜ How did you choose vendor, or make decision to develop in-house?

C-3. What network(s) are you using, and why?

➜ How did hardware/software relate to your network choice?

➜ Were/are there specialized/standard vendors for your industry?

➜ How did you choose vendor(s)—what were the key issues?
. Security
. Connectivity to customers/suppliers
. Translation capabilities
. Cost
. Service quality/level

D

Implementation— Management Process

D-1. What was the role taken by various groups in developing and implementing EDI?
• Top (corporate) management
• Corporate staff groups
• Divisional/functional area management
• IS management

D-2. What kind of internal resistance was encountered, and how was it handled?

D-3. How did you get your trading partners involved?

➜ Did they come to you, or did you go out and promote EDI?

➜ What external forces influenced your trading partners (e.g., industry standards/planning groups)?

➜ What (if anything) did you do to motivate your trading partners to shift to EDI? What did your trading partners do to influence you to adopt EDI? What incentives were provided by/to whom?
. Cost savings
. Improvement in service levels

D-4. What kind of support (if any) did you give your trading partners to help them implement their part of the EDI process?
• Technical/planning assistance
• Providing software and/or hardware
• Training/documentation
• "Help desk" functions

D-5. What kind of external resistance was encountered, and how was it handled?

E

Implementation—
Review
	E-1. What is your overall evaluation of the results you have achieved so far in implementing EDI vs. your original expectations?
	  • Cost/time/difficulty of implementation
	  • Volume/extent of usage
	  • Benefits realized
	  • Participation by trading partners

E-2.   Have you undertaken any formal reviews of your original plans and forecasts vs. actual results?
- Development/implementation cost/schedule
- Hard benefits ($ savings, ROI, etc.)
- Soft benefits (market share, service/quality levels, etc.)
- Who realized the benefits (internal, external)

E-3.   If so, who conducted these reviews, and how were the results utilized?

E-4.   What problems did you encounter, and what mistakes did you make? If you were starting over, what would you do differently?

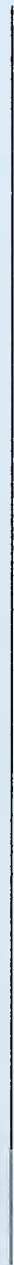**E-5.**   What advice would you have for others who are just starting out with EDI?
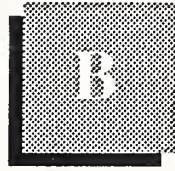
F

Future of EDI   **F-1.**   Please describe where you see EDI headed in the future:
- within your firm
- within your industry
- overall (including network and service providers, hardware and software providers, etc.)

B

Appendix: Glossary of EDI Terms

Appendix: Glossary of EDI Terms

ACCS - "Access." *Also*, the Aluminum Customer Communication System.

ACH - Automated Clearing House, a banking industry mechanism for electronic funds transfer. *Also see* NACHA.

AIAG - The Automotive Industry Action Group, a trade association. *Also* refers to EDI formats developed by the association.

ANA - Article Numbering Association, the U.K. industry group that introduced bar coding to that country and developed the Tradcoms EDI standard.

ANSI - American National Standards Institute.

ASC - Accredited Standards Committee.

Bar Coding - A standardized method of identifying products that facilitates data entry through scanning of coded printed labels.

Batch Processing - A data processing/data communications method that groups transactions. Compare to real-time processing.

CAD/CAM - Computer Assisted Design and Computer Assisted Manufacturing, a set of applications that use graphics to manage these functions.

CARDIS - Cargo Data Information System, a concept for trade documentation automation promoted by the National Council on International Trade Documentation. It has never been implemented in its proposed form. "CARDIS Element Systems" have been developed by several vendors serving the international trade community.

CCD - Cash Concentration and Dispursement, an electronic funds transfer format.

CEFIC - The Brussels-based Council of European Chemical Manufacturers, which sponsors an EDI project.

CIDX - Chemical Industry Data Exchange, a standard based on X12.

CLM - Car Location Messages, applied to rail car logistics.

Compliance Checking - A function which verifies that document information is received in the right order and in the proper format.

COMPORD - Computerized Ordering, an EDI system developed by the American Iron and Steel Institute.

COPAS - Council of Petroleum Accounting Standards, an industry association developing EDI standards.

CSI - Commercial Systems Integration, a professional service whereby vendors take complete responsibility for designing, planning, implementing, and sometimes managing a complex information system.

CTP - Corporate Trade Payments, an electronic funds transfer application.

CTX - An electronic funds transfer mechanism that is compatible with the EDI X12 standard and that carries information about a payment as well as transferring value.

DISH - Data Interchange for Shipping, a project sponsored by a European group of shippers, carriers, and agents.

EDI - Electronic Data Interchange. The computer-to-computer communications based on established business document standards, or using translations by EDI software housed on users' computers, located at remote computer service bureaus or on value-added network processors.

EDICT - Istel's U.K. EDI service.

EDIFACT - EDI for Administration, Commerce, and Transportation, the evolving international EDI standard.

EDX - Electronics Industry Data Exchange, based on the X12 standard.

EFT - Electronic Funds Transfer, the transfer of value.

Electronic Mail - The transmission of text, data, audio, or image messages between terminals using electronic communications channels.

Electronic Mailbox - A store and forward facility for messages maintained by a transmission or processing facility.

EMBARC - An EDI standard being promoted for use in the paper, printing, and publishing industries.

EMEA - Council for Mutual Economic Assistance, an Eastern Europe-bloc EDI association.

FASLINC - The Fabric and Supplier Linkage Council, a textile industry association dedicated to EDI development and other industry needs.

GTDI - General Trade Data Interchange, an international standard developed from TDI accommodating compromises between French participants in SITPRO, the agency behind U.N. certification of the standard. It is evolving into EDIFACT.

HCFA - Health Care Financing Administration, a U.S. government agency responsible for Medicare administration. *Also* describes a format (HCFA 1500) for health-care insurance claims.

ICOPS - The Industry Committee on Office Products Standards, sponsored by two office products trade associations for EDI applications.

IGES - International Graphics Exchange Standard, by which CAD/CAM graphics can be transferred electronically.

IIR/ACORD - Standards for paper and electronic insurance documents, developed by the Insurance Institute for Research and the Agent Company for Research and Development, which have merged.

Interface - The insurance industry term for EDI, using IIR/ACORD formats.

IRC - International Record Carrier, a common carrier providing messaging and network services. It is no longer limited to international communications.

IVANS - Insurance Value Added Service, provided on IBM's Information Network by an insurance industry association.

JEDI - The Joint Electronic Data Interchange Committee, which consisted of representatives of industry trade associations coordinating development of a reference EDI dictionary for the creation of new EDI transactions, segments, or data elements for international use. Its work has largely been supplanted by UNECE Working Party 4.

JIT - Just-in-time, an inventory management philosophy that plans delivery of needed materials and components immediately prior to final manufacture or assembly.

LDI - Logistics Data Interchange, information about the location of materials in transit through the manufacturing/distribution cycle.

NACHA - National Automated Clearing House Association, a banking services industry group.

ODETTE - Organization for Data Exchange through Teletransmission in Europe, an automaker's association EDI standard.

Ordernet - Sterling Software's EDI service. *Also* refers to EDI standards developed by the National Wholesale Druggist's Association for use in pharmaceuticals.

RCS - A Remote Computing Service facility which arranges to process some or all of a user's workload. Similar to a VAN (below) but without network services.

Real-time - A data processing or transmission method with data entered interactively. Response to input is fast enough to affect subsequent input. The results are used to influence a currently occurring process.

SAFLINC - The Sundries and Apparel Findings Linkage Copuncil, an association in the apparel and related industries promoting EDI and other industry needs.

SAM - Shippers Administrative Messages, a logistics service/application.

SITPRO - Simplification of Information Trade Procedures, a European EDI standards and trade facilitation agency that reports to the Department of Trade and Industry.

SMMT - Society of Motor Manufacturers and Traders, an automotive industry association responsible for the ODETTE project.

Store and Forward - The capability of a transmission or processing facility to hold messages or data until requested or until a prescheduled time.

SUPER - Study for the Utility of Processing Electronic Returns, an Internal Revenue Service test for electronic filing.

SUPERB - The IRS' electronic filing test program for business returns.

TALC - Textile/Apparel Linkage Council, a subcommittee addressing EDI standards.

TAMCS - Textile/Apparel Manufactuer's Communications Standards.

TCIF - Telecommunications Industry Forum, an industry group involved in EDI, bar coding, and similar technologies.

TDCC - The Transportation Data Coordinating Committee, an early advocate of EDI, now in the process of changing its name to the Electronic Data Interchange Association. *Also* refers to U.S. EDI standards.

TDI - Trade Data Interchange, an international shipping standard. *Also see* GTDI.

TEDIS - An EEC program to promote Trade EDI throughout industry and government.

Tradanet - An ICL (U.K.) EDI service.

Translation - Transforming information sent in one format to another format.

UB82 - A format for health claims insurance submissions.

UCS - Uniform Communications Standards, the EDI standards used by the grocery industry, based on X.12 and coordinated by the Uniform Product Code Council.

UNECE - United Nations Economic Commission for Europe. Despite its name, a broadly based representational body developing the international EDI standards called EDIFACT.

UNJEDI - United Nations Joint EDI committee developing technical and procedural standards on EDI.

VAN - Value Added Network, a common carrier network transmission facility, usually augmented with computerized packetizing which may also provide store and forward switching, terminal interfacing, and error detection and correction and host computer interfaces supporting various communications speeds, protocols, and processing requirements.

VANGUARD - A U.K. Department of Trade and Industry-sponsored awareness and promotional program for VAN and EDI services.

VICS - Voluntary Inter-Industry Communications Standards, a committee developing EDI standards between retailers and manufacturers.

WINS - Warehouse Information Network Standards, promoted by two representational associations, the International Association of Refrigerated Warehouses and the American Warehousemen's Association.

WP4 - Working Party 4 of the Economic Commission for Europe, commissioned by the U.N. to develop trade facilitation procedures and international EDI standards.

X.400 - A set of international electronic messaging standards.

X12 - A set of generic EDI standards, approved by the American Standards Committee.